PLATE I.

REPORT

OF THE

COMMISSIONER OF AGRICULTURE

FOR

THE YEAR 1865.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1866.

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IN THE SENATE OF THE UNITED STATES, *July* 25, 1866.

Resolved, That there be printed for the use of the Senate seventeen thousand extra copies of the Report of the Commissioner of Agriculture for the year 1865, and the accompanying documents; and three thousand extra copies of the same for the use of the Department of Agriculture.

IN THE HOUSE OF REPRESENTATIVES, *July* 19, 1866.

On motion of Mr. Latham, from the Committee on Printing,

Resolved, That there be printed of the Report of the Commissioner of Agriculture for the year 1865 one hundred and sixty-five thousand copies: one hundred and forty-five thousand copies for the members of this House, and twenty thousand copies for the Commissioner of Agriculture.

CONTENTS.

ILLUSTRATIONS.

REPORT

OF

THE COMMISSIONER OF AGRICULTURE.

DEPARTMENT OF AGRICULTURE,
Washington, D. C., November 27, 1865.

SIR: I have the honor to submit to you my fourth annual report, but the first which it has been my privilege to make while the people of our beloved country, from one end to the other, were at peace pursuing their wonted avocations.

But the results of the various operations of the department which I am able to lay before you are necessarily exclusive of the States recently in insurrection; the brief lapse of time since the cessation of hostilities, and the imperfect mail facilities of those States, not permitting systematic correspondence by which could be obtained accurate and reliable information from that section of the country.

I most sincerely congratulate the country upon the return of peace to our people, and render thanks to Him who doeth all things well for his merciful kindness and manifold blessings; for while one section of our fair country has been laid waste, and her citizens subjected to the devastating consequences of war—their implements of husbandry allowed to rust for want of use, and the earth to rest from yielding its products for the people's support—the other section has exhibited a condition of prosperity and plenty that would seem to ignore (were it not for the absence and loss of some of her best and bravest sons) the existence of a war. While more than a million of the hardy sons of toil have been called from their industrial pursuits to engage in warfare for the preservation of the Union, those at home have applied themselves with redoubled energy; and with the influence of higher wages in calling forth and economizing labor, and the aid of agricultural machinery and labor-saving implements and appliances, the farmer has been enabled to gather an abundant harvest. Thus those engaged in peaceful pursuits have been rewarded, even during the period of a most desolating war, with liberal wages for their labor and remunerative returns for the products of the farm.

The earth, too, has seemed to respond to the increased demand upon its fertility, and has given us, with the aid of the husbandman, an abundance having

no parallel in the history of that portion of the country, feeding the army and navy as well as the great mass of people in civil life, and leaving a surplus for exportation to foreign countries, and charitable donations for the alleviation of the suffering people of other nations.

While these products have commanded seemingly exorbitant prices, the industrial classes have had constant employment at remunerating wages; nor have these rewards of labor been depreciated or sensibly affected by the return of a vast army to the ranks of industry, or by the emancipation of four millions of slaves. So great are our resources calling urgently for development, that instead of fears of competition from returned soldiers, emancipated slaves, or foreign immigrants, (now flocking to our shores,) there is seen a decided buoyancy in the labor market, with a demand for increase of wages and fewer hours of toil.

Not only the necessaries, but even the luxuries of life are therefore easily attainable. How immeasurably preferable is this condition of things for the laboring classes, to a necessity for comparative idleness with lower prices; for low rates would then fail to bring the comforts of life within their control, while, with employment and adequate compensation, scarcely any price can place them beyond their reach. The great aim of the government should be to adopt a policy by which the agricultural, mechanical, manufacturing, and other industrial interests throughout the country should be fostered and encouraged, and the present time would seem most propitious for the initiation of such a policy.

The great contest in which we have been engaged is, I trust, forever ended. The courage, strength, and physical endurance of our people has been fairly tested, and, in the providence of God, has been decided for the country. A free republican government has been sustained, and the great problem of the capability of the people for self-government has been solved, and we stand to-day before the world, after the most desperate and persistent conflict that history records, a united and, I trust, a wiser and better people, full of charity for our erring brethren, and gratitude to those who have perilled their lives for their country's sake.

The energies of the people are now required to build up the waste places. The results of the war having changed the system of labor in some of the States, wise counsels and wholesome legislation, with just and charitable discretion, will be demanded in directing and dealing with the freedmen. I have no fear of the results, if employers and employed will mutually adapt themselves to the existing state of things; and I believe that a higher state of prosperity than was ever before enjoyed by the people of the South will be ultimately attained. It may be that the system of free labor will not prove favorable to large landed estates; and I am willing to confess my full belief that such a result will be beneficial to the great masses and to the country.

The average size of farms in the United States, in 1860, was 199 acres; almost double the average for Great Britain, which, in 1851, was 102 acres only, notwithstanding the great size of many baronial and aristocratic "holdings"—there being no less than 170,814 farms in the kingdom, or considerably more than one-half of the entire number, having less than 50 acres each. But the average in

outhern States is far greater than the general average for the United
, as the following table will show:

	Acres of improved lands.	Acres of unimproved lands.	Number of farms.	Average No. of acres in each farm.
are	637,065	367,230	6,658	151
and	3,002,267	1,833,304	25,494	190
ia	11,437,821	19,679,215	92,605	324
Carolina	6,517,284	17,245,685	75,203	316
Carolina	4,572,060	11,623,859	33,171	488
a	8,062,758	18,587,732	62,003	430
a	654,213	2,266,015	6,568	444
na	6,385,724	12,718,821	55,128	346
ssippi	5,065,755	10,773,929	42,840	370
ana	2,707,108	6,591,468	17,328	536
	2,650,781	22,693,247	42,891	591
sas	1,983,313	7,590,393	39,004	245
ssee	6,795,337	13,873,828	82,368	251
cky	7,644,208	11,519,053	90,814	211
uri	6,246,871	13,737,939	92,792	215
Total	74,362,565	171,101,718	764,867	320

e large proportion—almost three-fourths—of unimproved land in farms, in ion to the unimproved public lands, illustrates pointedly the necessity that y more labor be applied to their cultivation. The most populous States Union have the smallest farms, commanding the highest price per acre; he value per acre is, as a general fact, inversely proportionate to the size e farms. Thus the farms of Massachusetts average 94 acres; of Rhode d, 96; of Connecticut, 99; of New York, 106; of Pennsylvania, 109; f Ohio, 114 acres.

ery head of a family should have a homestead if possible. Thus an in- re to industry is created, and a spirit of enterprise encouraged, that will double the products of the country, increase the wealth of the States, dd to the resources of the nation.

this new order of things I feel the importance of the position which this tment should assume towards the people of the States now reassuming former relations with the rest of the country. With the question of re- ruction, or, more properly, reorganization, I have no concern; believing ibject to be in competent hands, and that its final and satisfactory settle- will be accomplished in due time. I shall, therefore, cheerfully put forth xertions, to the best of my ability, in aid of measures of reconciliation or the advancement of the interests of agriculture throughout the whole ry, believing that branch of industry to be the foundation of the pros- cf all nations, and the fostering of its interests by the government to be ately essential to such prosperity. History furnishes abundant illustra- of this truth.

e southern States will need much aid and encouragement in the coming . Their favorable climate and prolific fields should invite capital and late labor. In no other section can crops be cultivated with less labor,

nor are there any crops more remunerative than such as are peculiarly adapted to that section of the country. Their cotton is the best that has yet been produced in any country, and their sugar crop is one of great importance—Louisiana alone having produced in 1859 221,726 hogsheads of sugar and 13,439,772 gallons of molasses.

I have endeavored so to conduct the affairs of this department as to commend it to the favorable consideration of Congress and the approval of my countrymen, not doubting that its operations will be duly appreciated, and its labors ultimately crowned with complete success. I shall seek to increase its practical value and extend its influence, and hope it may continue to receive the liberal and fostering attention of Congress, and that those engaged in agriculture may be thereby stimulated to greater exertions and higher aims.

Our country possesses an advantage in soil and climate unsurpassed by any other on the globe for cultivating and perfecting all the necessary elements of subsistence and comforts for our entire population, with luxuries in abundance for the most cultivated tastes. With our extended and daily increasing system of internal improvements a failure of crops in one section of the country would scarcely be felt. These vast resources and appliances which spring into existence at the bidding of an industrious and energetic people daily add to the wealth and greatness of the nation, enhancing the happiness of the people; hence all are alike interested in the success of agricultural science; and if those engaged in it will pursue it with half the energy that characterizes those in other pursuits—availing themselves of all means of improvement, profiting by the practical experience of the most successful, and managing their farms systematically upon business principles—abundance and wealth will be their sure reward. From the wealth thus created and diffused throughout society will come with grateful pleasure the taxes for the support of the government and payment of the national debt, which, under equal and just laws, will be entirely extinguished with unprecedented celerity.

During the past year I have availed myself of the services of Messrs. V. D. Collins and John H. Klippart, gentlemen of skill and intelligence, well known to be devoted to the interests of scientific and practical agriculture, to visit parts of Europe and Asia, at a very small pecuniary outlay, compared with the advantages to be derived from their labors in the investigation of questions of present importance in the agriculture of this country. No reports having yet been received, the results of their labors will be given in detail in the agricultural report for 1865.

A very malignant disease among cattle, called the "rinderpest," or cattle plague, has been prevailing for some time, with fatal effect, in Russia, Great [illegible] and other European countries. Its ravages have been exceedingly [illegible], destroying in many instances whole herds of the most valuable and carefully bred cattle of Europe. It seems to be both contagious and infectious, and [illegible]h apprehension is felt for the safety of the cattle of this country. The importance of the subject seems to demand the immediate action of Congress, prohibiting the importation of farm-stock during the prevalence of the disease.

[illegible] occupied by this department are entirely inadequate for its

accommodation, being located, in part, in the Patent Office building, with other rooms in buildings disconnected from it. The increasing demand of the Bureau of Patents for additional room must shortly render it a matter of necessity to surrender the rooms now occupied by this department. For the better arrangement of the increasing collection of specimens in the museum, or object-library, and for greater convenience in the transaction of the business of the office, additional and more contiguous accommodation is highly desirable. I trust, therefore, that Congress will take measures for the erection of a suitable building, at as early a day as possible, for the use of the department.

Large quantities of new and valuable seeds, cuttings, and plants have been distributed during the last year throughout the country, in order to test the adaptability of such varieties to the various soils and climates of the different sections. These experiments, whenever they have proved a success, have been of inestimable value, not only improving qualities, but also increasing the crop productions per acre, and inciting to emulation in the introduction of new varieties.

In the distribution of seeds, 234,945 packages have been delivered to senators and representatives in Congress, 119,693 to agricultural and horticultural societies, and 408,593 to regular and occasional correspondents, and in answer to personal applications—making a total distribution of all varieties of seeds of 763,231 packages.

The distributions from the experimental and propagating garden during the past year have been mainly confined to varieties of the small fruits, such as grapes, strawberries, gooseberries, raspberries, and currants. Of these about 35,000 plants have been distributed through the usual channels.

The process of testing the respective merits of varieties of fruits is in active progress, so far as the capacities of the garden will permit. Additions are constantly being made to the list of plants selected for the above purpose. It is my constant endeavor to preserve the distinguishing feature of the garden for the propagation and dissemination of specialties, under intelligent supervision, and avoid its degeneration into a commercial nursery.

A new propagating house has been erected, substantially fitted with the most improved facilities, and is now in successful operation.

For the purpose of ascertaining whether among the many valued fruits of tropical regions there may be any worthy of artificial culture, I have had an apartment in one of the green-houses arranged in a suitable manner for their growth, and have opened a correspondence towards securing as complete a collection of these plants as practicable.

The assignment to this department of reservation No. 2, lying immediately west of the Smithsonian grounds, for the purpose of an experimental farm, has afforded an opportunity for the initiation of a series of experiments designed to test the value of foreign cereals, forage plants, and garden vegetables.

The grounds, with an unbroken soil of somewhat tenacious clay, came into my possession about the middle of April, quite too late to admit of being put in proper tilth for obtaining the best results during the present season. A few acres, duly fertilized and suitably pulverized, were planted with 346 varieties of

seeds, including 18 kinds of Indian corn, 34 of beans, 13 of peas, 77 of potatoes, (52 of which were seedlings,) 33 of melons, and many varieties, respectively, of tomatoes, beets, and other vegetables.

Specimens of cotton matured quite perfectly with the aid of fertilizers and high culture. Some of the foreign seeds promise to be acquisitions to our agriculture, either by virtue of excellence in quality, productiveness, or adaptation to special uses, soils, or climate. Further experiments will develop more completely and accurately their peculiar characters and values.

During the autumn the remaining portion of the grounds has been seeded with grasses and cereals, especially with wheats, embracing sixty-two varieties, from France, Prussia, Russia, Great Britain, Chili, and China. Valuable results are confidently expected to accrue eventually from these experiments.

An office and stable have been erected, at small expense, and a supply of Potomac water brought upon the premises.

The donations and additions to the museum have been increased to such an extent during the past year that the two small rooms appropriated to that purpose have been completely filled, and many of the most interesting specimens of fibres, sugars, seeds, &c., cannot be exhibited for want of space, and are therefore unavailable to those desiring to study them. The museum has been enriched by specimens of sheep and domestic poultry, showing the true types of the various breeds, and to what purpose each breed is specially adapted.

In my former report it was recommended that the collection of insects, birds, and model fruits belonging to Mr. Townend Glover, entomologist of the department, should be purchased by the government, and made the nucleus of a national agricultural and economic museum. This subject is earnestly pressed upon the attention of Congress.

The sum of five hundred dollars has been expended in sending Mr. Glover to Paris, to represent the interest of this department at the exposition of insects useful or injurious to the crops, which was held at the industrial palace, under the patronage of the minister of agriculture of France; where I am happy to say he received the first premium of the large gold medal of the Emperor Napoleon for his yet unfinished work on the insects of America, a work as original in its plan of arrangement as it will prove to be valuable in its proposed remedies for the destructive insects. He was nearly four months absent, and on his return brought specimens of the various silk cocoons and silk-producing insects, together with prepared skins of animals and game birds which are susceptible of domestication, and may with advantage be introduced and acclimated in this country. It is sincerely to be hoped that a portion of the propagating grounds, or some other convenient place, may be set apart for the purpose of commencing a garden of acclimation, from whence the llama, [illegible]hmere goat, and the improved breeds of domestic fowls, might be distributed [illegible] parts of our country.

[illegible] thus silkworm, which has succeeded so well in France, has been re[illegible] this year from Paris. This insect may now be considered as perfectly [illegible] and the silk produced by it is very strong and of good quality.

[illegible] report the laboratory has been fitted up and provided with

apparatus and other means of investigation. In regard to the practical results obtained I would refer to the report of the chemist, as showing that some original investigations have been made, and many questions answered which have been propounded by farmers, technologists, sugar-producers, and others, in all parts of the country.

Minerals, ores, and geological specimens have been received by mail and otherwise, in considerable quantities. Such as proved valuable, and could be properly identified as to locality, were retained as a nucleus for a mineralogical cabinet.

The field open for chemical science never was so great as at the present time. Chemistry being indeed the life and soul of an intelligent, rational agriculture, the governments of Europe—Germany taking the lead—impressed with this unquestionable fact, have established experimental agricultural stations, consisting of an experimental garden and a complete analytical laboratory. The chemist, provided with assistants, institutes on the spot such original experiments, and tests such theoretical problems in reference to agriculture, as would seem most prolific of benefit to the farming community and the world at large. To instruct the farmer as to the difference between robbing and tilling the land, to teach him to understand and take a lively interest in the practical experiments above alluded to, travelling teachers have been appointed, connected with these agricultural stations, whose office it is to impart useful knowledge to the masses by lectures and conversations. Thus every one may gradually be prepared to receive and profit by the rich stores of science open to every intelligent farmer.

Such is the appreciation of chemical science in Germany, where schools and private laboratories so abound, that at the present time two large laboratories on the most complete scale, are in the course of construction at Berlin and Bonn, at the expense of the state.

In the collection of statistics, during the past year, unusual attention has been given to farm stock. The waste of horses and mules by war, and the army consumption of meats, excited fears of deficient supplies of domestic animals, rendering necessary a reliable exposition of the number, price, and value of each kind in the several States—a labor undertaken with much care, and accomplished, it is believed, notwithstanding its difficulty, with a fair measure of success.

The tables of statistics resulting from these labors are applied to important uses—foiling the designs of speculators and correcting their misrepresentations; enabling the farmer to obtain the worth of his cereals, wool, meats, and other agricultural products; and directing the purchaser of store animals in what quarter to obtain most easily and cheaply his needed supplies for fattening. Accurate statistics, affecting commercial dealings in farm products, may thus prove of immediate and almost incalculable service to the agricultural community.

I may here remark that this system of collecting, compiling, and publishing farm statistics is attracting the attention and eliciting the commendation of European nations, and that many of their most practical statisticians acknowledge freely its superiority over prevailing European systems.

That these statistics, obtained monthly through thousands of intelligent correspondents, upon specific subjects peculiarly appropriate to the season, should be placed before the country at the time, and not be deferred until the publication of the annual report, is indisputable. The leading purpose in their presentation is to furnish a guide to producers in the necessary mutations of crop and stock production, and to act on the markets before the disposition is made of cereals, meats, and fibrous products of the farm. Hence the necessity and the origin of the monthly report. Its publication, at first opposed by several agricultural papers, under the erroneous impression that it might conflict with private interests, excites no opposition since it is seen to avoid ordinary topics pertaining to agriculture, and to consider only those that are national in their character or bearing.

The annual and monthly reports are entirely distinct in their character. The first treats of subjects of a permanent nature, in the form of carefully written essays. The second is confined to topics less permanent, and often of transient or passing importance; it considers them briefly, touching upon leading points only, avoiding details, and ignoring the ornaments of style and a labored arrangement.

A brief general summary of the more important statistics of this division are as follows:

GENERAL SUMMARY RELATING TO FARM STOCK.

Showing the total number of live stock for January, 1864 and 1865, the increase and decrease thereof, the general average price of each kind, the value of each kind, and the total value of all.

Animals.	1864.	1865.	Increase.	Decrease.
Horses	4,049,142	3,740,933		308,209
Mules	280,847	247,553		33,294
Cattle and oxen	7,965,439	7,072,591		892,848
Cows	6,066,748	5,768,130		298,618
Sheep	24,346,391	28,647,269	4,300,878	
Hogs	16,148,712	13,070,887		3,077,825
Total	58,857,279	58,547,363	4,300,878	4,610,794

Number, average price, and total value in January, 1865.

Animals.	Number.	Average price.	Total value.
Horses	3,740,933	$80 84	$302,425,499
Mules	247,553	102 08	25,041,488
Cattle and oxen	7,072,591	26 17	185,090,087
[illegible]	5,768,130	36 70	211,718,270
Sheep	28,647,269	5 40	154,807,466
Hogs	13,070,887	8 55	111,796,318
[illegible]			990,879,128

GENERAL SUMMARY RELATING TO CROPS

ncing the number of bushels, &c., of each crop, the number of acres of each, he value of each, and the bushels, acres, and value of all, and the increase nd decrease of the same, for the years 1863 *and* 1864, *and the comparison etween the same years.*

AMOUNT OF CROPS.

	1863.	1864.	Increase.	Decrease.
an corn	397,839,212	530,451,403	132,612,191	....
eat	173,677,928	160,695,823	....	12,982,105
	19,989,335	19,872,975	....	116,360
s	170,129,864	175,990,194	5,860,330	....
ey	12,158,195	10,716,328	....	1,442,567
kwheat	15,786,122	18,700,540	2,914,418	....
itoes	98,965,198	96,532,029	....	2,433,169
Total	888,546,554	1,012,959,292	141,386,939	16,974,201
acco	163,353,082	197,460,229	34,107,147	....
	18,346,730	18,116,691	....	230,039

ACREAGE OF CROPS.

ian corn	15,312,441	17,438,752	2,126,311	....
eat	13,098,936	13,158,089	59,153	....
	1,439,607	1,410,983	....	28,624
s	6,686,174	6,461,750	....	224,424
ley	557,299	540,317	....	16,982
kwheat	1,054,060	1,051,700	....	2,360
atoes	1,129,804	902,295	....	227,509
acco	216,423	239,826	23,403	....
y	15,641,504	15,034,564	....	606,940
Total	55,136,248	56,238,276	2,208,867	1,106,839

VALUE OF CROPS.

ian corn	$278,089,609	$527,718,183	$249,628,574	....
eat	197,992,837	294,315,119	96,322,282	....
	20,589,015	31,975,013	11,385,998	....
s	105,990,905	139,381,247	33,390,342	....
ley	13,496,373	16,941,023	3,444,650	....
kwheat	12,660,469	21,986,763	9,326,294	....
atoes	55,024,650	77,184,043	22,159,393	....
acco	24,239,609	29,335,225	5,095,616	....
y	247,680,855	365,707,074	118,026,219	....
Total	955,764,322	1,504,543,690	548,779,368	....

The above tables of the general summary do not show the exact comparative ferences between the years 1863 and 1864, because the latter year embraces crops of Kentucky, which are not in the year of 1863. Deducting Kentucky m 1864, the comparison will be as follows:

Table of comparison between 1863 *and* 1864.

	1863.	1864.	Increase.	Decrease.
Total, bushels	888,546,554	959,821,150	71,274,596	....
Total tobacco, pounds	163,353,082	140,503,760	....	22,849,322
Total hay, tons	18,346,730	18,004,366	....	342,364
Total acreage	55,136,248	53,950,797	....	1,185,451
Total value of crops	$955,764,322	1,440,415,435	$484,651,113	....

The table of comparison between 1863 and 1864 exhibits much that is important. The increase in the bushels of grain is large, and the decrease in the pounds of tobacco raised is also great. The decrease in acres cultivated is 1,185,451, but the increase in the value of the above crops is $484,651,113.

The first increase is from the corn crop, and the last may be attributed to an increase in the currency, or a spirit of speculation.

General summary of the amount of the crops of 1865, *compared with those of* 1864 *and* 1863.

	1865.	1864.	1863.
Wheat, bushels.....	148,552,829	160,695,823	179,404,036
Rye, bushels..................	19,543,905	19,872,975	20,782,782
Barley, bushels.......	11,391,286	10,632,178	11,368,155
Oats, bushels	225,252,295	176,690,064	173,800,575
Corn, bushels..................	704,427,853	530,581,403	451,967,959
Buckwheat, bushels	18,331,019	18,700,540	15,806,455
Potatoes, bushels..............	101,032,095	96,256,888	100,158,670
Total bushels	1,228,501,282	1,013,429,871	953,288,632
Hay, tons.......	23,538,740	18,116,751	19,736,847
Tobacco, pounds...............	183,316,953	197,468,229	267,267,920

In the western States the wheat crop is very deficient in quality. It has been estimated by the department that the deficiency in both *quantity* and *quality* is 26,241,698 bushels; in quantity alone 12,172,944 bushels. The quality of the corn crop is excellent, and that of the remaining crops is believed to be an average. The number of bushels in 1865 exceeds those of 1864 by 215,071,411.

The prices, average, and value of the crops of 1865 will not be calculated until February next. The greatness and excellence of the corn crop must be gratifying to all.

The balance of the appropriation for the service of the fiscal year ending [illegible], 1865, remaining unexpended on the 1st of December, 1864. was [illegible]. There was appropriated for the fiscal year ending June 30, 1866, [illegible]

[illegible] expenditures from December [illegible], 1864, to November, 1865, amount to [illegible], leaving an unexpended balance of $98,584 81.

Since my last report of the special appropriation of $20,000 "for investigations test the practicability of preparing flax and hemp as a substitute for cotton," ere has been expended $4,500 40, leaving a balance of $10,500 remaining in e United States treasury.

The increasing demand made upon the department for the agricultural report, hich is yearly becoming more extended and urgent as the appreciation of its alue and usefulness is widened and intensified, induces me to ask Congress for n additional number of copies. The limited number allowed for circulation by e department forbids a very liberal distribution among those engaged in agri-ultural pursuits, who especially desire and seek the information it contains; any of whom are dependent upon the department for their supply. A single opy to each of its correspondents would alone absorb nearly the entire annual llotment to the department.

There should also be retained a sufficient number of each volume for the ture supply of foreign exchanges, libraries, and agricultural and kindred sociations.

Respectfully submitted,

ISAAC NEWTON,
Commissioner of Agriculture.

His Excellency Andrew Johnson, *President.*

REPORT OF THE SUPERINTENDENT OF GARDEN.

SIR: I have the honor to submit the following notes and remarks upon the ogress and practical operations of the garden:

At the risk of repetition, I would again allude to the limited area of the garn. It is highly necessary that the department should possess complete chards of the various hardy fruits. At least one tree or plant of every riety should be kept, thus forming a living museum, which would be of eat value for reference. As it is, only the small fruits can be accommodated, d, to test all the new varieties even of these, it is found necessary to eradite those that proved to be comparatively worthless. This, although perhaps great loss, does not fully serve the purpose of a national garden, which ould preserve specimens of all, in order to assist in the identification of sorts, d also exhibit the progress made in their improvement.

GRAPES.

Inquiry is frequently made as to the best mode of propagating the grape, e information sought, however, having reference more to the character of ant produced than to the mode of manipulation—whether the best plants are ose produced from long cuttings, single eyes, or layers; and also to the lative merit of plants produced partially or altogether under glass, and those own wholly in the open border. So far as the health of the plant is inlved, as having an influence upon its future growth, there is no difference in y of the above-mentioned modes, provided it has ripened and thoroughly atured both wood and roots. Plants of the very best description have been roduced from single eyes of young green shoots taken off in May, rooted, and ept in pots during summer. These have made growths from six to eight feet n length, thoroughly ripened to the tips of the shoots, and formed as fine lants as may be desired for permanent planting.

To produce plants from such soft and succulent cuttings, it is absolutely ssential that they be placed under glass and in a warm bed, technically botom heat, and as soon as roots are formed the young plants are potted and kept growing freely under glass—but not in a close atmosphere—a position they may occupy until growth is complete; or, they can be planted out in the open ground by the end of July. Unless with new or rare varieties there is seldom any necessity for this mode of propagation, which requires considerable skill and care; but it is proper to state that as good plants can be procured by this as can be by any other mode, and, in respect to being exempt from old wood, it is superior to any other mode of propagation by cuttings. It is a system of multiplying all kinds of plants more universally adopted than any other, and answers quite as well with the grape as with any other plant.

Where cuttings are plentiful, the most economical method of raising plants is by long cuttings in the open border. These should not be less than four inches in length, and need not be over six inches. Selecting a well pulverized soil, rather light or sandy, insert the cuttings in rows, pressing them down so that the bud rests on the surface; the soil should be made firm around them, and if slightly covered with strawy manure (only a sprinkling—chaff will answer better if obtainable,) to prevent surface evaporation, a very large per-

centage will form fine plants without any further care than that necessary t keep down weeds and cultivate the surface.

Ordinarily there is no better mode of propagating grapes than that known as by the single eye or bud. As indicated, these are made with one bud re tained, and about one inch of wood below it. Plants from these have but little old wood in their structure, and so approach as near as possible to plant produced from seed, although, as far as this is concerned, the plant fr a green wood cutting has decidedly the advantage. Single eye cuttings of o wood are generally placed under glass, and receive a slight bottom heat This, however, is not indispensable, and they will do well on a green-h shelf. The great point in their management is to preserve sufficient moistur in the soil so as to prevent the sap in the cutting from exhaustion until roots are formed. They may be planted out doors and succeed if caution i taken not to allow the surface to become dried; it is merely a question of evaporation. A slight bottom heat is useful to force the plant, but it sh be applied very gently until indications of rooting appear. In climates where the growing season is comparatively short there is advantage gained in get the plants well advanced before setting out.

When roots are sufficiently advanced, the plants are placed singly in pots, and planted in the open border as soon as the weather is favorable. As evidence of the strength and vigor of plants procured in this way, it may be noted that specimens have been grown in one summer, from single eyes set spring, that have produced several pounds of fruit the following season.

Wood intended for cuttings should be pruned off in November, cut in convenient lengths, and buried at once in the soil, covered at least nine inches. By doing so the sap is retained, and many failures in cuttings can be clearly traced to causes which will in this way be obviated.

Layers of the young wood is another legitimate mode of propagating vines, and from old established plants a few shoots can be laid down during the early part of summer, form good rooted plants before winter, and that without materially injuring the fruit crop.

As previously remarked, it matters but little to the future well-being of the plant as to which of the above modes have been employed in its production, provided it has properly matured its growth.

There is one point in regard to roots which it may be well to mention. When the plants are grown in a deep, porous, rich soil, the roots ramify into numerous small fibres, which have been not inaptly described as "horse-tail-like bunches." Plants having such appendages as roots are not in good condition for removal, inasmuch as these hair-like fibres are destitute of woody matter, and soon decay on exposure to the atmosphere. The possession of such roots is a very convincing proof that the plant has not completed (or rather not matured) its growth, and its future progress will be feeble. Unfortunately there is too great a tendency to the production of such growths, since most of the native grapes are more or less checked with mildew during the growing season, an influence which also extends to the roots. The best plants are those with the greatest amount of hard brown ripened tops, furnished with moderately strong, and what may be termed stout, wiry roots, and although these, to a n[illegible]e, are not so enticing in appearance, yet they are the best adapted to furnis[illegible] abundance of fresh and vigorous spongioles, and, consequence, vigorou[illegible]

[illegible]ANTING.

[illegible] young vi[illegible] is planted in its permanent location it should be [illegible] down to two buds, and this without reference to the manner of its [illegible]pagation [illegible]en the strongest layers should be so treated. One cane is

ufficient to grow, but, to be prepared for possible accident, both buds should e allowed to start until the shoots are long enough to admit of tying to a take, then the weakest may be removed or pinched back. During the sumner the plant should be allowed to grow undisturbed, except tying up the hoots; the more foliage the more strength will the roots attain. The question s frequently asked, "At what age should a vine be allowed to bear?" The nly answer that can be given is, simply, *when it is strong enough;* and it hould be cut down closely at the annual winter pruning until it sends up a ane of sufficient strength to bear fruit, which it will do, in ordinary culture, he second summer from planting.

PECULIARITIES OF VARIETIES.

Of the Labrusca or Fox species, the most exempt from mildew are the Concord, Hartford Prolific, Ives's Seedling, Dracut Amber, and Northern Muscadine. All of the Cordifolia species are eminently hardy; mildew or rot rarely attacks them. The Clinton is a familiar example of this class, and the most reliable wine grapes will ultimately be produced from improved varieties of this section. The following is the average order of ripening of some of the earliest varieties: Adirondac, Hartford Prolific, Roger's Hybrid No. 3, Dracut Amber, Delaware, Concord, Logan, Creveling, Ives's Seedling, Roger's Hybrid No. 4, Canby's August, Allen's Hybrid, &c. It may be remarked that the same varieties do not always ripen in the same rotation even on the same grounds and location.

The best fox-grapes, or those having a strong musky flavor with great sweetness, are the Dracut Amber, Rachel, Northern Muscadine, and Perkins. These are all robust, and very hardy and productive; excellent for giving the genuine American flavor to wine, which will probably, in course of time, be regarded as a distinguishing characteristic of native wines. They are also good table grapes to those who admire this flavor, a taste for which exists to a larger extent than is generally supposed. Such strong wood-producing varieties as Clinton, Taylor, Alvey, Franklin, etc., do not require to be so closely pruned in the fall as those of less robust habit. They should be allowed considerable extent of trellis or support, so that they can extend the yearly growths to lengths of twelve to sixteen feet, and pruned back but slightly; fruit will then be produced profusely; but, if closely cut in winter, a mass of wood growth only will be the result.

The To Kalon is particularly subject to rot, so much so that it is not a profitable kind to plant.

Of white grapes, the Cassidy and Anna are the most productive, Rebecca and Maxatawny best flavored. Allen's Hybrid and Clara are also good, but being seedlings from foreign varieties, are not always reliable. When they can be protected from mildew, satisfactory crops will be produced. Taylor is a poor bearer, unless on thin soils and with but little done to it in winter pruning. The Concord still maintains its supremacy (all things considered) as the best native grape for general cultivation; although subject (with all of its family) to rot, yet it always produces a fair crop, and being but little troubled with leaf mildew, the wood is well ripened, and consequently is least injured during winter. The Delaware is first-class, but not always reliable. The same may be noted of the Diana and Catawba, fruits of first quality when had in perfection. The Yeddo grape, from Japan, continues to prove unsatisfactory; very liable to mildew, and very late in maturing even when in health; fruit not of first quality when compared with the best native varieties.

Of the Roger's Hybrids there are some very promising varieties. No. 3 is decidedly a good early grape. No. 4 large and fine in bunch and berry, and of medium quality in flavor. No. 1 is productive, later in ripening, but a white

fruit of great promise. No. 15, large and very fine. No. 22, high flavored and ripening quite early. These vines are just about as subject to mildew as Catawba and Isabella, are very much better here than when grown where they originated—in this respect resembling the Concord and some other varieties.

The Alvey proves to be a very sweet, tender skinned grape, and may be found of value for wine. It is not objectionable as a table grape.

Ives's Seedling proves very hardy and reliable, but not equal to Concord as a table grape. Said to be valuable as a wine grape.

MILDEW.

This is the great obstacle in the way of extended grape culture, and although the facts connected with its external appearance are very easily traced, the physiological condition of the plant when attacked, and the *modus operandi* of the progress of the disease, have given rise to much speculation, and some very strange fancies have been promulgated on the subject; but, unfortunately, none of them have proved to be of much advantage to the fruit grower. So far, the following points have been deduced from observation:

1. That mildew on the leaves of the grape is mainly the result of atmospheric influences.
2. The *Peronospora*, or mildew, that attacks the leaves on their under surface, is encouraged by the atmospherical conditions accompanying dull, cloudy weather, with occasional showers; or when heavy dews are deposited in positions where the rays of the sun cannot penetrate, or, at least, where the moisture cannot readily be evaporated.
3. That, so far as is known, no peculiar constitution of soil, or mode of soil culture, has any influence in its prevention.
4. That, so far as known, no mode of pruning or training, except so far as they agree with the fifth paragraph, has any effect in warding off the disease.
5. That shelter and protection by covered trellises, or masses of foliage, will greatly modify, if not entirely prevent injury from mildew.
6. That varieties of grapes having downy foliage are much more liable to be attacked than those that are smooth or shining.
7. That all grapes having downy foliage are not equally sensitive to the conditions favorable to the fungoid development, but where a pubescent foliage and a smooth foliage are growing side by side, the former, even of the most robust variety, may be attacked while the latter may be exempt from injury.
8. That the appearance termed *sun scald* is simply the result of this mildew.
9. That timely and repeated applications of sulphur, dusted on the foliage, will check the growth of fungi.

Occasionally another form of mildew may be observed on the vine. This shows itself on the upper surface of the foliage, giving the leaves the appearance of having been dusted with flour; this belongs to the Erysiphe family of mildews, and, although very destructive, is not so fatal as the *Peronospora*.

This floury looking substance can easily be removed by brushing the foliage; it is most frequently to be seen on foreign grapes, but may be observed on native varieties in seasons of extreme drought—dry weather seeming to favor the spread of this particular species. The young fruit and even young shoots are sometimes coated with this mildew. It retards growth and injures the plant attacked, so that it is easily destroyed by slight frosts. Sulphur will both prevent and cure it.

CAUSES AFFECTING THE HARDINESS OF PLANTS.

The occasional destruction of fruit trees and vines during winter is one of the many annoyances experienced by the cultivator; and it is all the more perplexing when it is found that a plant will sometimes be destroyed by a less degree

f cold than it previously endured without the slightest injury. The amount f cold that plants are capable of resisting is a question of much interest, more specially when we reflect that the power of resistance is dependent upon circumstances which are, to a certain extent, under control.

The necessity for protecting plants, even those of reputed hardiness, from the injurious effects of alternate freezing and thawing, is now admitted by the best cultivators, although it is not unusual to meet with those who pretend to place no value upon a plant that cannot "take care of itself;" as if it was not the province of man to assist nature in producing such results as he finds most profitable and useful. Those who "leave plants to nature," after placing them under artificial positions, only frame an excuse for ignorance or indolence.

It has never been shown that frost is beneficial to plants; but it is a growing and well-grounded opinion, founded upon experience and observation, that many of the diseases of plants result from repeated injuries during severe frosts and extreme changes of temperature throughout the winter months. The exact manner in which plants are killed by cold has formed a subject of much speculation. The commonly received opinion is, that frost acts mechanically upon vegetable tissue by expanding their fluids and bursting the cells or vessels in which they are enclosed. This explanation, however, is not sufficient to account for all the phenomena attending the death of plants from cold. Doubtless many plants, especially those of a very succulent nature, may be destroyed from the disruption of tissue by the expansion of the sap in freezing. But it is also well known that the extraction of moisture by evaporation, when in contact with a continual cold, dry atmosphere, very frequently proves fatal. Thus it is that many plants which do not seem to be injured in the slightest by a degree of cold sufficient to freeze the sap, are destroyed by the keen, dry winds of spring, even when the thermometer is above freezing; and hence it is that grapes, roses, raspberries, and other plants suffer more from March winds than they do from January frosts; and hence also the utility of protecting against this destructive evaporation. The effect of these drying winds is apparent in the shrivelled and dried appearance of the buds and bark; and although there is less likelihood of injury to thoroughly matured growths, yet it is in accordance both with theory and observation that plants whose juices are preserved by proper protection during winter will shoot forth more vigorously in spring, are more fruitful, and arrive earlier at maturity than those not sheltered from climatic extremes.

It cannot be too vividly impressed upon the mind of the cultivator that the ripening of the seasonal growth is the greatest desideratum. How much of the (ıpointment in fruit culture arises from excessive stimulation of shoots that ver become mature, it would be no easy task to determine. We are convinced ıt the time is rapidly approaching when planting fruit trees and vines in hly enriched soil, and treating them with heavy dressings of nitrogenous ıures, will be looked upon as conclusive evidence of unskilled culture. Not t all stimulation is unnecessary, but that the production of mere wood-growth i the production of fruit are distinct, and may be carried so far as to become onistic processes, and must be recognized before the highest excellence in ruit culture can be attained.

On the best means of prevention from the evil effects of freezing plants, the following remarks of Lindley are to the point: "The mechanical action of frost may, however, undoubtedly be guarded against to a great extent. It is well known that the same plant growing in a dry climate, or in a dry soil, or in a ation thoroughly drained from water during winter, will resist much more cold than if cultivated in a damp climate, or in wet soil, or in a place affected by water in winter. Whatever tends to render tissue moist, will increase its power of conducting heat, and consequently augment the susceptibility of plants to the influence of frost; and whatever tends to diminish their humidity, will also diminish their conducting power, and with it their susceptibility. This is

an invariable law, and must consequently be regarded as a fundamental principle in horticulture, upon attention to which all success in the adaptation of plants to a climate less warm than their own will essentially depend. The destructive effects of frosts upon the succulent parts of plants may thus be accounted for independently of the mechanical expansion of their parts; indeed, it is chiefly to that circumstance that the evil effects of cold in spring may be ascribed, for it has been found that trees contain nearly eight per cent. more of aqueous parts in March than at the end of January, and all experience shows that the cultivation of plants in situations where they are liable to be stimulated into growth and, consequently, to be filled with fluid by the warmth and brightness of a mild protracted autumn, exposes them to the same bad consequences as growing them in damp places, or where their wood is not *ripened*; that is to say, exhausted of superfluous moisture, and strengthened by the deposition of solid matter resulting from such exhaustion."

The ripening process consists in the slow but gradual and complete removal of watery matter, and the conversion of fluid organizable materials into the more solid substances which are necessary to form woody fibre; and its effects are not only seen in the power conferred of resisting cold, but also in providing an abundance of the secretions necessary to sustain the growth of the following spring, and produce the flower-buds upon which future hopes depend; for it is well known that flower-buds will not be produced unless the elements of growth have been maintained in due relative proportions.

We can thus partly see how far it is in our power to assist nature in supplying the requisites for perfect maturation of growth. The fruit grower will be careful to avoid planting in wet or highly enriched soil that would tend to encourage prolonged growth in the fall; he will see that his strawberry plants are not neglected during summer after the crop is gathered; that weeds are prevented from gaining a foothold; that the plants are thinned and fully exposed to sun and air, in order to perfect flower-buds for the following spring; that his raspberry plants have been divested of the old bearing wood, the young shoots thinned and disposed at proper distances so as to allow them a free enjoyment of light; that his grapevines have an abundance of healthy foliage, so as to ripen the young wood for his future crop; and that his peach trees are not suddenly denuded of their foliage, while it is as green and fresh as in the month June.

When a fundamental principle is once determined and understood, operative details are suggested, and from them the best practical mode of application readily deduced; for instance, many of the most beautiful evergreen ornamental trees, such as the Asiatic conifers as well as those from the western coast of this continent, cryptomerias and deodars, sequoias and taxodiums, have, in our moist fall growing weather, a tendency to make a luxuriant growth which never ripens, and, as a natural consequence, it is destroyed by winter cold. Now, if these growths are checked in September by judicious root-pruning, the wood will mature, shoots become hard and woody, and, instead of being unripe and filled with watery fluid, be solid and firm, and fully prepared to stand the extremes of our wintry climate. The whole subject of the acclimation of plants is based upon maturity of growth.

ROTATION OF CROPS

Among the essentials requisite to maintain a high degree of success in cultivation, a proper system of rotative cropping occupies a prominent place. The advantages of rotation in farm crops are well known; yet, in the garden, the practice is very common to grow the same kind of crops for years in the spot of ground. It is, perhaps, within the bounds of possibility to pursue is course successfully, but to do so will require an annual return to the soil, in

some form, of the several ingredients extracted by the plants. Our knowledge of the application of science will not warrant much faith in this direction, even if chemists were decided as to exact respective amounts of the ingredients used by various crops. But allowing it to be practically attainable, and looking at it in the light of mere economy, a change of crop is every way desirable; since by proper care two dissimilar crops may be produced on the same ground in the same season; and, further, the operations necessary for the culture of one kind of crop are of a nature to form a good preparation for the succeeding one.

Physiologists do not altogether coincide in their opinions with regard to the principles upon which the beneficial results attending systematic change of crops are based. Some support what may be termed the repletion or excretory theory, which proceeds on the supposition that the roots of all plants during their growth give out certain substances peculiar to themselves, which, in time, impregnate the soil to such an extent as to render it unfit for the growth of that particular plant, but has no deleterious effect upon the growth of a different family of plants, if, indeed, they are not rather to be considered as capable of promoting growth and acting as stimulants to such.

It is a well-ascertained fact that certain if not all plants do impart to the soil, through their roots, a portion of their juices. The soil surrounding the roots of the oak tree has been found impregnated with tannin. The roots of the spurge laurel impart an acid, resinous matter. The poppy exudes a substance analogous to opium; the root of any plant growing in water will soon render it turbid, but the quantity of such matters hitherto detected has not been considered sufficiently important to account for the remarkable beneficial results which have followed a rotative system of cropping.

The above theory has been supported by very high authority, but it seems to be giving way to the following, viz: that although plants are made up of the same primary elements, yet different species require them in widely varying proportions, so that each plant has a characteristic formation peculiar to itself. It therefore follows, that if there is a lack in the supply of these peculiar ingredients of plant food, the plant will not be maintained in healthy growth. From this it appears that the reason why a crop, if constantly grown upon the same spot of ground, shows a yearly loss in productiveness, does not arise from a repletion of any substance, but rather from exhaustion. In a practical view, it is evident, from either of the above theories, that a change of crop is requisite to successful cultivation.

In cultivating garden vegetables great facilities are presented for a frequent change of crop, and there is, also, a wide field for experiment in order to ascertain the kinds best suited to succeed one another in a regular system. For instance, it has been asserted that melons will produce best when grown on soil previously occupied by tomatoes. In general, long, tuberous, rooting plants, as carrots, beets, parsnips, &c., should be followed by those that root near the surface; plants that are cultivated for their seeds should be followed by those grown for their foliage. The seeds of all plants contain a larger amount of the mineral ingredients than their leaves, so that plants grown for their seeds will exhaust the inorganic matter of the soil to a greater degree than will be effected by plants grown only for the use of their leaves.

In the arrangement of crops in the field or garden, there are two methods that may be adopted, either of which will provide for rotation. In the first place a spot of ground is occupied wholly by one crop, and when that is removed its place is immediately occupied by another; or two or more crops are so planted on the same piece of ground that the one will be ready for removal before it interferes with the growth of the other. The first method may be illustrated by planting with early peas or potatoes, which will be removed in time for planting cabbages or celery, or sowing beets, turnips, or spinach. Early crops of carrots and beets will be removed in time for a planting of late dwarf beans. Many

modifications will be suggested in practice. Perhaps the most economical method, especially where ground is limited in quantity, is to grow several crops at the same time on the same piece. For instance, peas may be sown in March, in rows, six feet apart; in May a row of melons may be planted between the peas, the shade afforded by the peas will benefit the young melon plants, or, between the peas a row of dwarf beans may be planted, and when the peas are removed their place may be occupied by cabbages, and the beans be succeeded by a crop of turnips. It does not seem necessary to multiply examples, as those who are inclined, and will exercise due foresight, will suggest many expedients.

Much variety can be produced in even a small garden by this method, and it affords great facilities for sheltering young and tender crops by those of more matured or robust growth. It may, however, be remarked, that although most plants are benefited by a little shade and shelter when young and delicate, it is highly injurious when long continued.

FOREIGN GRAPES IN GLASS STRUCTURES.

The simplicity and certainty with which the foreign grape can be produced in glazed houses is not generally known. Many amateurs, whose success with other fruits is quite satisfactory, feel doubtful of their ability to manage the exotic grapery.

To those whose only acquaintance with the subject is derived from perusing publications on the growth of this fruit, the supposition of inability is pardonable; for there is certainly much to appal the beginner, in perusing the various ideas of soil and border making, the conflicting opinions relative to watering, and the multitudinous, fussy details of management, which he will find in print.

So much has been written of late years on this subject, that it would not now be referred to were it not with a hope that information might be imparted that would tend to dispel the idea of difficulty or mystery, in connexion with the culture of this, without exception, most economical of fruit productions. It is well known that, in favorable locations, the Chasselas, Black Hamburg, and many other of the varieties of the foreign grape will occasionally produce perfectly ripened fruit with no further care than that usually given to the Isabellas, or any other native variety. But although the result may occasionally be reached, it is well known that all attempts to cultivate the foreign grape in the open air, east of the Rocky mountains, have, sooner or later, proved abortive.

That these failures are attributable either to a deficiency of sunlight or to a deficiency of summer heat are questions easily answered; for we find that in the climate of Britain, where the dull, sunless days are more abundant, and the summer heat of less intensity and of shorter duration than with us, the Hamburg and other exotic grapes ripen yearly, trained on outside walls and trellises, and this in a climate where the heat is not sufficient to mature Indian corn, tomatoes, or even peaches, in common field culture as with us. Neither can it be supposed that our own summers are too hot, or our winters too cold, as it is well known that there is scarcely any plant that will withstand extremes of summer heat and winter cold so well as the grape, provided it maintains good health. But unfortunately, there are climatic conditions here during which the grape is rendered subject to the attack of fungoids, by which its growth is checked, the wood prevented from maturing, and a general debility engendered which enfeebles the plant to a degree that, sooner or later, ends in its total destruction.

This tendency to mildew is, then, the only obstacle in the way of successful open air culture, in this section, of the best wine and table grapes of Europe; and is the only reason why glass structures have to be employed in their culture, where an artificial temperature, more in accordance with their requirements, may be maintained. The tendency to mildew in the foreign grape, having been d so great a barrier to its extended culture in the open air, recourse was

had to glass houses where protection could be afforded and means adopted for the exclusion of this malady; but in many cases, even here, success has not been equal to expectations. The mistaken eagerness of many to keep the plants in an artificial instead of a natural condition, has led to frequent failures. It appears very obvious that a plant which occasionally succeeds in the absence of any particular protection, would be enabled to do so uniformly by a very slight additional care, provided that this additional care was bestowed in the proper direction; and that such is the case has been proved beyond a doubt.

Having on another page of this report treated more particularly on mildew and its origin, it may suffice to remark here, that it is altogether dependent upon the amount of atmospheric moisture, and proper ventilation; and without proper attention to these points, mildew is just as likely to destroy the plants under glass, as it would be those in the open air. Keeping in view that these remarks are intended to refer to the general routine management of what is now more definitely known by the term *cold grapery*, we will briefly allude to what is considered the main points of treatment.

The principal points, then, are *a low night temperature, exclusive top ventilation, and the constant presence of moisture available for evaporation.* The baneful effect of a high temperature in plant-houses has been shown in previous reports. It has been proved repeatedly that low or bottom ventilation in a grapery is conducive to mildew, and aridity must be prevented by the presence of moisture.

It would require considerable space to enter fully into the elucidation of all the principles involved; it will, therefore, be considered sufficient for the present to briefly trace the course of practice deduced from many years' extended observation and experience in the growth of the foreign grape.

As soon as spring growth commences, attention is at once directed to the night temperature, so that it will fall at least 20 degrees below the average heat in the house during the day. In dull, cloudy weather, of course, this difference between day and night may not be so great, and if the nights are frosty, it will be necessary to close the house; but in the absence of actual external freezing, the ventilators should not be wholly closed, even during night. When all danger from night frosts is passed—which will vary, according to locality, from the middle of May to the middle of June—the ventilators may be left open day and night. During dull cool weather it may be necessary to partially close the ventilation both day and night; but as a general rule, the same amount is used day and night. We have seen graperies where the ventilators were never disturbed from the period of blossoming until the ripening of the fruit. No constant anxiety is, therefore, felt about sheltering or opening sashes, and the liability to create sudden changes of temperature, that frequent alterations of the ventilators are sure to produce, is prevented. The temperature of the hou will, therefore, participate in the general changes of external atmosphere, a though warm during sunlight, will be cool during darkness. During the mest portion of the summer, the day temperature may vary from 90 to 110 rees by day, to 65 to 80 degrees during the night. This lowering of temure during darkness insures a hardihood of growth that enables the plants o ure any unfavorable change that may occur, without sustaining the least ury.

As air is heated, its capacity for abstracting and containing moisture increases, and unless the moisture is supplied from other sources, it will be drawn from the plants. To supply this evaporation, the soil should be kept damp on the surface. Once a day at least, in bright weather, the soil will require to be sprinkled. It is a good rule never to allow the surface soil to be entirely dry until the fruit is coloring to ripen; but it is important to know that, unless in connexion with constant night ventilation, this treatment may prove injurious.

So far as the management of the atmosphere is concerned, this is all

the care required, and a crop of grapes is thus as easily grown as a crop of potatoes, only with more certainty, because more under our control.

With regard to soil, pruning, &c., we will at present only remark, that soil capable of growing good cabbages will grow good grapes, and the strongest yearly growths give the best fruit.

MULCHING.

This is an auxiliary operation in cultivation, that would be more generally practiced if its beneficial effects were better understood.

The objects to be attained by mulching are twofold, viz: to preserve a uniform degree of moisture in the soil during summer, and protect the roots of plants from severe frosts during winter. These conditions are obviously important to vegetation, and they can be very efficiently secured by covering the surface with a stratum of porous materials, such as tan bark, charcoal dust, leaves, or strawy manure, which will prevent the surface soil from becoming compact or hard, and, at the same time, assist in maintaining a uniformity in its mechanical texture favorable to the retention of moisture. Air is the best non-conductor, and bodies are represented as good or bad conductors, just as they are solid or porous. Iron is a better conductor than wood, granite stone a better conductor than brick, hard pressed soil is a better conductor than soil that is loose and porous. A hard trodden path is warmer in summer and colder in winter, than the cultivated ground alongside of it. When the soil particles are in pressed contact, the condition is favorable to rapid conduction; summer winds passing over such a surface, carry off the moisture which the heat evaporates; the surface is speedily parched dry, and vegetation languishes.

When the surface is covered with a mulch of such porous materials as those enumerated, it in effect secures a stratum of air in repose between the soil and the causes of radiation and evaporation. In the case of recently planted trees, the preservation of a uniform degree of moisture in the soil surrounding their roots, is a great point towards their successful growth; and, other things being equal, they will languish or flourish in proportion as this condition of uniform moisture is secured.

Although mulching is really a very simple operation, yet serious losses have occurred from its misapplication. We have seen trees destroyed from too heavy mulchings of grass, manure, and tan bark. Before applying the mulch to a recently planted tree, if in spring, shape the soil around it in basin-form, extending the rim beyond the extremities of the roots; by this configuration of surface, rains will be retained and, if required, artificial waterings can be applied to best advantage. With regard to fall planting, the process should be reversed and a slight mound formed towards the stem of the plant, so as to throw off the heavy rains of winter. Of course such mound should be removed before the following summer.

As already remarked, the principal use of winter mulching is to prevent frosts from reaching the roots. The best material for this purpose is charcoal dust. Where manure is used, it should not be thrown close up to the stem of the plant, otherwise it might prove a harbor for ground mice, which in rough ground, or under a coarse covering, are sometimes very destructive, by eating the bark of young trees. When they are troublesome, the precaution should be taken to trample firmly over the roots and around the stem after heavy snows, and keep the surface clear and compact.

In order to be effectual, it is not necessary that summer mulchings should be heavy. When tan or charcoal dust is used, a layer of two inches in depth will be quite sufficient. Grass cut from lawns is very suitable, but a mere sprinkling only should be applied at a time. Thick coatings promote fungoid growths, which frequently destroy trees. Fruit or ornamental trees that have been trans-

planted, will rarely be much benefited by mulching after the first year's growth. The advantages of mulching to growing vegetables are equally important. Cabbages, potatoes, peas, onions, and other crops, will thus be enabled to maintain growth during the driest weather. This covering is not intended to supersede stirring the soil, but when plants become so far advanced in growth as to be beyond the hoe and plough, mulching may be applied, and those who give it a fair trial on their crops in a dry season, will not require further promptings to repeat the practice.

HEATING GLASS STRUCTURES.

An efficient system of heating green-houses is always a matter of much interest in their construction and adoption; the expenses attending the fitting up of a heater and the subsequent cost of fuel have always been great obstacles, and have been the means of preventing many persons from building, more particularly since it has been an opinion somewhat prevalent that a boiler and pipes for the purpose of heating and circulating water is indispensable for the proper diffusion of heat. There is no doubt that water is the best conductor of heat, and, where extensive houses are to be warmed the superiority of water in this respect, together with other advantages connected with its application, such as neatness, cleanliness, &c., will always point out that mode as being the most desirable. Looking at it as a matter of mere economy, we can at once decide that the cheapest mode of heating green-houses is by means of well-built and properly constructed flues. At present prices of material and labor it is probable that for a house, say sixty feet long by twenty wide, it would cost ten times more to erect a boiler with sufficient piping than would be required to build a furnace and flue. But the economical advantages of the flue are not all absorbed in its first cost. Even with the best form of boiler there is great waste of heat which may be economized in a good flue. To prove the above assertions would take more space than we purpose, neither is it indispensably necessary at present; the object in view is to show that there is much fallacy extant concerning the great superiority and economy of heating by hot water, and to attempt to describe some points in the construction of an efficient furnace and flue.

The furnace should not be less than two and a half feet in length; one foot wide, and sixteen inches in height; the sides should be lined with good fire-brick placed on edge, backed by four inches common brick. Very little mortar should be used, and that quite thin; indeed, they are frequently laid without mortar—that is, the fire-brick casing. The arch or covering is formed by projecting fire-brick a few inches over the sides, so that the opening left can be covered by one length of the same kind of brick, the whole covered and made level on top by two or three courses of common brick. This is quite as strong for the purpose intended as a regularly built arch, and saves material as well as labor in constructing. On each side of the furnace a space of four inches in width is left to cut off the head from communicating with and being absorbed by the surrounding building or earth. This chamber is continued the whole length of the furnace, and also a few feet on the flue opening into the house. As soon as the sides of the furnace become heated the cold air will rush in, collect the heat radiating from the exterior of the furnace and convey it into the house, thus completely preventing disruption by expansion, a frequent occurrence in furnaces of great apparent solidity. In order to assist in the combustion of the gases of the fuel, and also increase the draft and propulsion of the heat through the flue, an opening at least six inches square should commence at the end of the ash-pit, continuing under and entering into the bottom of the flue two feet from the back of the furnace.

The greatest defect of the smoke flue is its unequal distribution of heat. In this important particular hot water pipes have a great superiority. The whole

extent of their surface being heated to a nearly uniform degree, the heat is given off at a comparatively low temperature; whereas, near the furnace the flue is heated to excess, while the greatest portion of it imparts little or no warmth to the atmosphere.

This is the flue as ordinarily constructed with brick set on edge; it has been found, however, that by adopting the principle of diminishing the thickness of the material of which it is constructed, as it recedes from the furnace, a flue can be made so as to radiate heat over its entire surface at nearly the same temperature. As an example, supposing 100 feet of flue were required in a house, then the first ten feet from the furnace would be formed of brick-work four inches in thickness, covered on top with a double thickness of brick; then the following thirty feet would be made of bricks on edge, covered by a single brick; then finish the length with terra cotta piping of eight inches diameter, which is usually about three-quarters of an inch in thickness. A flue so built will absorb heat very regularly over its surface, and so far will approach a hot-water apparatus in efficiency, at a greater economy of fuel and at a cost easily reached.

It is well to have the flue as roomy as possible, especially near the furnace. When common brick are used for covering, the width inside cannot be more than seven inches; if its height is made of three bricks on edge, its dimensions will be about twelve inches by seven inches inside. The less mortar used in the joints, the longer will it stand, and all plastering of the flue, either inside or out, is very objectionable. It is also well to keep in view that hard-burned bricks will transmit heat more rapidly than those that are soft and porous. In all cases, where practicable, the flue should rise one foot in twenty from the furnace. If one foot in ten feet can be gained, so much the better.

MECHANICAL PREPARATION OF SOIL.

The physical or mechanical condition of the soil, its relation to air and water, has not received that attention from agricultural chemists which its importance demands. They have devoted their investigations almost solely to its chemical constituents, seeming to lose sight of the fact that the permeability of the soil to atmospheric influences is of more importance than the most approved manures. If the money that has been expended upon artificial manures during the last twenty years had been devoted to drainage, sub-soiling and trenching, the products of the country would have been vastly increased.

The soil performs various offices towards growth of plants. It serves as a basis in which they may fix their roots and sustain themselves in position; it also supplies inorganic food during all periods of their growth, and may be looked upon as a laboratory in which many chemic changes are taking place, preparing the various kinds of food which it is destined to yield to the growing plant. Analyses have shown that in most soils the presence of all the constituents of the ashes of plants may be detected, though in variable proportions. But the mere presence of certain substances in soils does not insure productiveness, for it has been shown that crops have failed even in soils possessing all the mineral ingredients required, because, although present, they were not in a sufficiently soluble state to be available. Thus in wet, clayey soils, although containing enough of plant food, the water prevents free access to the decomposing influence of the atmosphere, and crops perish; not because of a deficiency of raw material, but on account of the processes for its preparation being arrested.

This leads us to the foundation of all improvements of such soils, viz., draining. It is a remark frequently made by those having no experience, that draining must be worse than useless in a climate where summer droughts are among the greatest calamities against which the cultivator has to contend.

who have witnessed the effects of draining need not be told, that even in not particularly retentive, draining, in connexion with deep culture, will e a more ample and lasting supply of moisture in dry weather, and maintain wing vegetation during the most severe droughts. Draining increases the bility of the soil for absorbing moisture; all soils have their certain absorb-roperties; like a sponge, they absorb until their pores are filled, and only uperfluous water that cannot be taken up passes through the drains.

aining is only the first step towards improvement. The soil must be ly loosened and pulverized, either by subsoiling or trenching. Either ss will be beneficial, and circumstances will decide as to which is to be ted. Trenching involves a thorough reversion of the soil, of more or less 1, according to its nature and the purposes for which it is to be used. oiling is merely a loosening or stirring up of the immediate subsoil, without sing its position. When the ground is intended for a permanent crop, such it trees, grapevines, &c., trenching may be adopted. The top surface of soil will then be placed where the roots will be immediately benefited by d the crude subsoil brought to the surface, where it can be enriched by the f manures and the ameliorating processes of cultivation.

the other hand, if the ground is to be immediately cropped with small , as in some portions of a vegetable garden, a finely pulverized surface is sary, and few subsoils can be made available, or be reduced to that condi-while in their crude state. Subsoiling will, in such cases, be most advis-and trenching can be executed as crops will admit of the operation.

e first process, then, towards securing a profitable depth of soil is drain-next breaking into the subsoil, taking into consideration, whether, in view e crops to be cultivated, it will be most immediately profitable (of ultimate there is no uncertainty) to trench it at once, or merely break up and loosen ibsoil, admitting water and other fertilizing agencies to penetrate, and by dual trenching improve to the required depth. When all this has been actorily accomplished, manures can be applied to the greatest advantage, ilures from droughts almost entirely obviated.

WILLIAM SAUNDERS.

n. ISAAC NEWTON.

ORT OF THE SUPERINTENDENT OF THE EXPERIMENTAL FARM.

: When I was appointed to take charge of this place, in September, I the southwest square and the southeast square had been manured and d with a variety of seeds and roots. The other portions of the ground een ploughed several times, and a large quantity of first class manure from overnment stables had been applied as a top dressing, and subsequently hed in. The grounds have been divided into six different lots, a drive round the whole, and cutting across at two places, with one centre drive, all the several lots are of easy access. The land generally is of a clayey e, with a slight admixture of sand, and had not been ploughed and culti-for a long period before it was granted to the Department of Agriculture. oil, naturally tenacious, had been trampled by many cattle while used as ernment corral, and the action of the hot sun made it very hard to break out with constant stirring and the application of large quantities of well nted manure, combined with the exposure of as large a surface as possible elements, it has become very friable and easily managed. The two south

squares are of a more sandy nature, and are better adapted for growing vegeta-bles than any of the other lots. There were no buildings on the place but a small office, but there has since been erected a good five-stalled stable for horses, also a seed-room and tool-house, and attached to the main building there is a cart and wagon shed, also a yard in which the Angora goats are kept. A suit-able office of two apartments has been erected at a convenient distance from the other buildings. The several kinds of grain and grasses which had been sown turned out remarkably well, considering the lateness of their planting and the condition of the soil. The sorghum was a fine crop, and from the small tity sown there was raised two barrels of very fine, pure seed. Seventy-seven kinds of potatoes had been planted, fifty of them seedlings from Germany. T seedlings did not all come to proper maturity, but those which did were sel for further experiment. Some of the other varieties did very well, especi Goodrich Early, and a kind called the Orono Unrivalled; this last yielded mensely, and seems to luxuriate in this climate and soil. When the pota were dug, they were all pitted in the open air; first covered with six incl of straw, afterwards with twelve inches of earth, and then thatched with straw again, and during very severe frost a covering of fresh horse-manure was ad but removed on the return of thaw. All the potatoes kept well in this way were in a fine condition when opened in spring. A small portion of land sown with buckwheat, called Silver-skinned, the whole of which was saved the purpose of sowing a greater breadth next season, as the kind is a very uable one, being a much clearer and thinner skinned variety than the usual in cultivation, and quite as prolific. Two acres of corn were sown for fo ; it grew very rapidly and produced an immense quantity of forage, which well cured and fed to the horses all winter.

The clovers, of which two varieties were sown, have taken with the ground well. The Alfafa or Chili clover grows very luxuriantly in the early part of the season, but does not withstand drought so well as the Alsike clover. The Alsike is perennial in its nature, and will prove a great acquisition to this coun-try, as it produces a very abundant crop, and is likely to suit this climate. Among this clover was found a millet, which appears to be a new variety, as there is nothing of the same kind in cultivation in this quarter. The millet from the Crimea is also a very valuable variety. It produces an immense amount of foliage, and grows about four feet high. There was a small yellow corn from southern Russia, which seems to be of considerable value, as it ripens in ninety days from the period of planting. All the seed is carefully saved for further experiment. There was also a very small bean from Russia, more like a pea than a bean in shape, which deserves especial attention. When first sown, it comes up very slowly; and when other beans, sown at the same period, are beginning to flower, this one has not made much show; but gradually it de-velops itself and spreads along the ground, covering a great breadth with a perfect mass of rich, dark green, luxuriant foliage, and producing an immense quantity of pods, which are generally about five inches long. The small area of ground experimented with produced at the rate of forty-two bushels per acre. Next season it will be more extensively cultivated.

WHEAT.

In the early part of September, the middle west square was ploughed twice and dragged before sowing with wheat. When the quantities were large, the seed was sown broadcast; but when the quantities were small, which was the case in all but two instances, the seed was drilled at 13½ inches between the rows. Sowing was begun on the 15th of the month, and all the seed sown came up very rapidly, and very soon covered the ground. In fact, some of the kinds made too much headway, as the severe frost killed many of the finest sorts. The following is a list of the kinds of wheat experimented with:

sery Wheat, Sole's Winter, Reid's White, Eastern Prussian Scheffell, Wes-russian Scheffell, Frumento Andriolo Esastico Rosso, (Froment Renfle et Blanc,) Frumento Andriolo Esastico Bianco, (Froment Petanielle et Glabre,) Frumento Rosso Collo Barbu, (Froment d'Odessa Rouge ,) Granone Winter, Arnautka, Hallett's Pedigree, Tappahannock, Prus- 1, Prussia No. 2, seven varieties no name, (from Prussia,) Blue Stone, f's White Bearded, Premium White Mediterranean from Port Mahon, Red d Mediterranean, Fenton, Trump, Red Chaff, Hopetown, Tauntondean, nian, Amber, English Wooley Eared, Chinese, Australian, Golden Drop, Chaff, Chiddam, Blue Cone or Rivetts, Sandomir, Small Cujavish, Sher-ed Bearded, Browick Red, Spaulding's Prolific, Red Nursery, Red Thick-ver's Red, Red Lammas, Clever Highland, Hard or Horny, Kessingland, ng's Hallett's Genealogical, Welch, numbers 1, 2, 3, 4, 5 and 6, Puget Weddell's, Oxford, Nairn Peige, A. Bell's, Champion, Wunder, Blue n, Golden Swan, Vilmorin's, Dorking's Glory, Essex White, Drowed's, ra, Piper's Thickset, Blue Refford, Tall Cluster, Algier, Flickling's Pro-rodiè's, John Dunn's, A. Hay's, Old Red, Hunter's White, John Ste-Schonermark's, Weizacker Winter, Nottingham Red, Eley's Reissen, Dwarf, Baxter's, Archer's Prolific, Canadischer, Club Headed, Grin-Lammas, Red Chili, Black Sea.

SPRING WHEATS.

rica, April Red Bearded, Arnautka Hard, Oregon, Summer Spelt, Fernor Summer.

wheat crop generally, on this place, has been very good, with the excep-some of the varieties which did not stand the winter, and some kinds d too late, and in such small quantities that their merits were not suffi-tested. On the 15th of September, sowed two ridges of red bearded rranean wheat, and two ridges of premium white Mediterranean wheat, ort Mahon, both of which came up in four days, and, in consequence of , open weather which prevailed before frost set in, they made a very pearance. On the 9th of October a sowing of both of the above kinds ain made; they also came up well, but not so rapidly as the first sown During the winter, the first or September sowing of the premium white rranean wheat withstood the winter very badly, and during the severe the month of January, it was entirely killed; whereas the same wheat n October withstood the winter much better than the red bearded Medi-an wheat, kept ahead the whole season, and was harvested on the 27th e. This seems to be a wheat well adapted to this climate, large berry, led and thin skinned; produced forty-eight bushels per acre. The red d Mediterranean wheat sown in October did not stand the severe frost so the same kind sown in September, showing that the best period for sow- red bearded Mediterranean wheat is September, and for the premium Mediterranean, from Port Mahon, is October. The Tappahannock wheat en the earliest of all the varieties experimented with, although it does m to be so productive as some of the other kinds; still the fine quality grain, and its earliness, is very much to be regarded, as an early variety h less liable to disease and other contingencies. Some of the kinds promised to be fine crops when growing, turned out very coarse samples. of the spring wheats are remarkable for their productiveness and early ty. The Arnautka hard spring wheat, April red bearded wheat, and Sea wheat, are about the best, sown from the 12th to the 29th of March, rvested 10th of July.

RYE.

The following varieties, mostly from Prussia, have done very well. The kind called Eldenaer Bastard rye is very peculiar—more like wheat than rye, very large and thin-skinned:

Probstier rye, rye from the city of Tirnia, in Saxony, Spanish Double, Corren's, John's Day, Seelander, Champagner, Eldenaer Bastard, Mandschure, Ri Standen, Shortheaded Corren Standen, Poland, San Joaquin, Bushy Sum from Saxony.

OATS.

A few winter oats were sown in the fall, but they did not withstand the sudden frosts and thaws to which they were exposed. The following kinds were sown in March, and all drilled in at 13½ inches between the rows. This was a very favorable season for oats, and those experimented with were all good but the Hopetown:

Potato oats, (from R. L. Dorr, Danville, New York,) Hopetown Potato, (from England,) Black Prussian, Great Flag, Cumberland, White Swedish, Yellow Lithuania, White Tartarian, Black Tartarian, Black Poland, Dyoick's Early, Nun's, Berlie, Blainslie, Late Angus, Early Angus.

BARLEY.

Barley requires a colder and more humid climate than this to promote its early growth; although some of the varieties grown did pretty well, still there was a shortness of straw which was against its weight considerably. The varieties grown are all first class of their kind when raised in England. The Hertfordshire Hero barley never came into ear at all. The following kinds have been grown:

Chevalier barley, Hudson Golden Melon, Moldavian, Thanet, Hertfordshire Hero, Golden Drop, Brewer's Delight, Page's Prolific, Peruvian, Great, Laland, Weizacker, Oderbruch.

The last mentioned barley is grown very extensively on the low, formerly swamp lands of the valley of the Oder, but which were drained during the reign of Frederick the Great, and has since produced the very best barley known on the continent of Europe. It is a very favorite variety for the porter brewers of England, and for which they pay a very high price. The sample experimented with, of this variety, was very small, and the season was too far advanced before it was received to test it properly. It, however, came up vigorously, and appears to be of robust growth, but had not time to mature.

RICE.

Four kinds of rice from Japan were sown; the seed must have got heated, or, perhaps, was too old, as none of it ever germinated.

SORGHUM.

Four varieties of sorghum have been grown, viz: red sorghum, sugar, black and red, all from Shantung; the other is sorghum imported from China. They have all been planted as far separate as possible, so as to preserve the different kinds from hybridizing. They all look well, especially the first three varieties, and seem to be something new.

PEAS.

out seventy varieties of peas were sown, four feet apart in the row, on the kind of land, and all about the same date. The whole did well except a rom Germany, which were in very small lots and did not appear to be of it. The following kinds were grown:

rly Sugar peas, Sugar, Green Dwarf Market, Knight's Dwarf Market, f Smooth Honey Market, Early Dwarf Market, Early English Crooked e Flowered, Pole, Green Mammoth, Small Mammoth, Large Mammoth, f Blue Imperial, Tom Thumb, Bishop's Early Dwarf, McLean's Little Philadelphia Extra Early, Emperor or Morning Star, Dwarf Sugar, Early e, Daniel O'Rourke, Deacon's Double Extra Early, New Early Telegraph, h's Perfection, Eugenie or Alliance, Champion of England, Napoleon or ıx, Blackeyed Marrow, White-eyed Marrow, Evergreen Marrow, Beck's McLean's Epicurean, McLean's Princess of Wales, Bedman's Imperial, an's Premier, the Yorkshire Hero, Small Prussian, Saxton's Prolific, r's "first crop," Sutton's Long-podded Tom Thumb, Scimitar, Harrison's , King of the Marrow, Dickson's Favorite, Warner's Emperor, Beck's taker, British Queen, Ne Plus Ultra, McLean's Princess Royal, Bishop's -podded Dwarf, Dickson's First and Best Early, Wheeler's First Early, s Dwarf Mammoth, Knight's Tall Green Marrow, Advancer, Surprise, Green Marrow, Wonderful, Sangster's No. 1, Competitor, Wonder of the d, the Washington, White Russian, Partridge, Common Gray, Flack's ry, Denyer's General Havelock, Champion of Scotland, Fairhead's Excel- Magdeburg Gold, Spanish peas from Port Mahon, Naples.

kson's "First and Best Early" pea is superior to any of the peas experi- d with for earliness, productiveness, and general good qualities. The pod s pea was longer than any of the other early sorts, and was uniformly filled large well developed peas. Sown 24th March, bloomed 10th May, and eady for picking on 28th May.

rter's "First Crop" is a very early pea, height 2½ feet, not quite so produc- s Dickson's "First and Best" pea, but has the advantage of ripening all its about the same time. Sown March 21st, bloomed 8th May, and ready for ıg 28th May.

ıeeler's "First Early" pea, said to be earlier by one week than "Daniel ırke" or "Sangster's No. 1," but did not prove so here; although a very early pea, resembling Carter's "First Crop" pea very much, not quite so ctive as "Sangster's No. 1." Sown 24th March, bloomed 9th May, and icked 29th same month.

ıgster's No. 1, a synonym of Daniel O'Rourke, height 3½ to 4 feet, very as productive as Dickson's "First and Best Early" pea, strong habit, arly. Sown 24th March, bloomed 10th May, ready for picking on 29th

Lean's "Little Gem" pea, a dwarf, prolific, green wrinkled marrow pea, eat acquisition; having a fine flavor, sugary, early, and requires no stakes, ng about 14 inches high. Sown 20th March, bloomed 10th May, and was for picking 10th June.

second early peas, Advancer, Warner's Emperor, Ne Plus Ultra, an's Epicurean, McLean's Princess of Wales, McLean's Premier, Saxton's fic, Magdeburg Gold, The Yorkshire Hero, and Dickson's Favorite are all and come in soon after the more early varieties, being all good bearers, uitable for general cropping.

BEANS.

irteen kinds of the long-pod Windsor bean, and four varieties of horse were planted. Very few of them ever came to any perfection, being en-

tirely destroyed by insects, and the climate generally being too hot and them. The kidney bean comprises the several sorts grown, viz:

Early Six Weeks, White Kidney, China Red Eye, Newington Early Valentine, Robin's Egg Dwarf Kidney, Cream-colored Dwarf B Canadian Dwarf Yellow, Common Brown Haricot, Variegated Dwarf, Haricot, Dwarf White Sugar Pearl, Negro Long-podded French, Tho fold Dwarf White, Dwarf White Kidney, Black and White Sugar, Bush, Paris Sugar Dwarf, Dwarf Yellow Sugar, Large White Lima, H tural, Black Mexican, and five kinds without names.

POLE BEANS.

White Kidney Pole Bean, Arabian White Flowered, Variegated Black Stake, Scarlet Runner, and Arabian Colored Runner.

GRASSES AND CLOVERS.

About three acres were seeded down with timothy the first week in O It came up very regularly, and the land being in good condition, it made start before frost. The winter was very severe, and in the spring its appe for a crop was very indifferent; but it gradually tillered out, and in the of June there was cut and cured about eight tons of splendid hay. The math has grown tolerably, and produced about two and a half tons of goo The Alsike clover and Alfafa, or Chili clover, both produced good crop succulent and nutritious nature. The Alfafa, when young, would make fine feed for soiling cattle, but it has a tendency to grow very woody an when allowed to mature. The Alsike, on the contrary, keeps green and riant up to its period of ripening, and has not the same tendency to ge and fibry. The other grasses sown are as follows:

Medicago lupulino, Trifolium filiforme, Trifolium repens, Trifolium in tum, Onobrychis sativa, Apium petroselinum, Cynosurus cristatus, Pl lanceolata, Festuca duriuscula, Festuca pratensis, Festuca ovina, F tennifolia, Festuca elatior, Anthoxanthum odoratum, Alopecurus pra Poa pratensis, Poa trivialis, Poa nemoralis, Poa annua, Bromus Sch Dactylis glomerata, Avena Flavescens, Evergreen rye-grass, Ayrshire nial grass, Pacey's Perennial grass, Esparset, Pimpernell grass, Franz grass, Black Nonesuch or yellow clover, yellow suckling clover, white scarlet crimson or Italian clover, sainfoin, sheep parsley, crested dogsta grass, hard Fescue grass, meadow Fescue grass, sheep's Fescue, fine Fescue, tall Fescue, sweet-scented vernal, meadow foxtail, smooth-s meadow, rough-stalked meadow, annual meadow (from Australia,) c grass, yellowish oat grass, burr clover, cocksfoot grass, English Italia grass, clover from Richmond or Turkey clover, soft hairy cockle grass.

CABBAGES.

Eighteen varieties of cabbage have been grown, viz:

Little Pixie, Early Dwarf York, Nonpariel, Early Emperor, Sugar Couve Tronchuda, Carter's Matchless, Imperial Oxheart, Extra Fine Shilling's Queen, McEwan's Early, Enfield Market, Wheeler's Imperial nought, White Cwt., Robinson's Champion Drumhead, Winningstadt, Red ling.

Little Pixie, Early Dwarf York, Early Emperor, Carter's Matchle Imperial Oxheart, are the five earliest of the above-named varieties. Al sown in the drill March 31, never transplanted, and were fit for tab June. Little Pixie is very small, but makes a compact head early.

r forms a good large firm head, but the best of the five was Carter's : having the largest and best formed head of any of those experi- with. Several of the others are very good, but later, especially Robin- Champion Drumhead, which grows to an immense size..

SAVOYS.

ie following kinds have been tested:

ather Stem Savoy, Dwarf Ulm, Dwarf Green Curled, Drumhead.

e Dwarf Ulm Savoy is the earliest and decidedly the best. The Drum- is also very good.

LETTUCE.

teen varieties of lettuce have been tested.

ow's Matchless, Hardy Hammersmith, Moor Park, and Neapolitan are the and much deserving of further experiment. Wheeler's Tom Thumb is od, said to be, by the raiser of the seed imported, the smallest, pret- and finest flavored lettuce in cultivation. It has proved itself to be so Some of the others are tolerably good, but not equal to those men-

ONIONS.

teen sorts of onions have been grown, viz:

Keeping, White Globe, Brown Globe, Brown Portugal, White Por- , White Spanish, Giant Madeira, Nuneham Park, White Lisbon, Dan- New Yellow, Silver Skinned, Red Italian Tripoli, Blood Red.

onions were sown on the 29th of March, the seed being drilled in three apart. They were kept clear of weeds, and the earth constantly stirred horse hoes and cultivators all summer. The Giant Madeira, White Lis- and Red Italian Tripoli have yielded immensely; the others have turned olerably well, but are not so large in size. Specimens of the Giant Ma- weigh 1¼ pound, White Lisbon 12 ounces, and Red Italian Tripoli 14 es, respectively. All of the different kinds of seeds not enumerated in any above lots, but tested here, have turned out, with few exceptions, to be very . Some of them require to be harvested before much can be said regarding merits. About thirty-six varieties of seeds were received from Japan. were all put into the ground, but scarcely one-half of the different kinds up. There is something very peculiar in the most of those which have n, and all are evidently new varieties unknown in this country.

ere is a cucumber which beats anything grown on the grounds here, for nd productiveness; all the seeds of this kind are being carefully preserved ibution. Some of the beans promise to be good, but they are not far advanced to judge of them sufficiently. There were several varieties eds sown which came from Vienna; among them is a white curled endive, h is one of the finest grown. It seems to do well here, and is much supe- o the others. There are also six varieties of radishes growing, and there white variety called the white monthly radish which is very fine, and pro- ced by those who have tested its qualities to be superior to anything they ever tasted. There are four varieties of Kohl rabi, which are quite distinct the common English kinds, seeming to be of much finer quality, and likely better adapted for domestic purposes.

TOMATOES.

veral varieties of tomatoes have been tested, but the Tilden, and Carter's w tomato from London, England, are the best. The Tilden merits all

that has been said about it by those who have recommended it to public notice; but Carter's Yellow far surpasses it in richness and quality of flesh. Seed of this kind is being carefully saved for further experiment.

POTATOES.

Forty-three varieties of potatoes are being tested. Eight of them are directly from the celebrated growers of seedling potatoes, viz., Messrs. Paterson & Son, Dundee, Scotland, and are named, respectively, Paterson's Early, Paterson's Blue, Paterson's Victoria, Paterson's Scotch Blue, Paterson's Alexandra, Paterson's Regent, Paterson's Napoleon, Paterson's Red. These all have great reputations in their native country, but time will develop what they will do here. They look very well and appear to yield good crops here also. The other varieties are very promising and are likely to turn out well. When they are gathered, the ground will be measured, and the quantity produced of each particular kind will be weighed, so that an estimate of their produce per acre may be ascertained. The Goodrich Early keeps ahead of any of the varieties tested, for earliness, although the Samaritan is not far behind it, but does not yield as largely.

MELONS.

Upwards of thirty kinds of cantaloupes and watermelons have been tested. Among the cantaloupes and muskmelons, particularly, there is one from Spain, which has been very much regarded as superior to anything hitherto grown in this country. There is also one called Michies's netted muskmelon, a very superior variety. Several of those from Buenos Ayres and Port Mahon are very good also. The watermelons were late planted, but notwithstanding the coolness of the season they have grown amazingly. There is a watermelon from China which puts all the others in the shade for sweetness, firmness of flesh, and general good qualities; the seed of this kind is perfectly white. There are also some from Russia which have grown well and are very good, having a very thin rind, and the flesh firm and solid.

Several kinds of pumpkins and squashes have also been planted, but at this time have not sufficiently matured to speak of them definitely.

One kind of tobacco was grown which was sent to you from Turkey, without any name, but which, from its appearance while growing, resembles the Latakia tobacco. It is quite different from any of the known varieties of tobacco grown in this country. It does not produce such an amount of leaves as some of the others—the leaves being wider apart on the stem—but they are much thinner and finer in quality. All the seed has been carefully saved off this lot, and will be distributed from the department.

On a place like this, where so many varieties of seeds have been tested, it is almost impossible to arrive at a fair conclusion with one year's experiments; but by carefully comparing the different qualities of each separate variety, and experimenting in succeeding years with those known to be good, and comparing them with new varieties, a more reliable opinion will be arrived at, and also better methods of managing and securing the different kinds of seeds, so that only those which can be relied on will be secured; as it is almost impossible on so limited a space to keep some kinds from hybridizing.

GEORGE REID.

Hon. I. NEWTON.

REPORT OF THE ENTOMOLOGIST.

SIR: During the past year most of my time and attention have been given to the agricultural and economic museum under my charge. This museum or cabinet, illustrating, as it does, in the most practical way, the relations existing between the farmer's insect enemies and his feathered friends, will, when thoroughly established and systematized, form the foundation for a most complete course of instruction in entomology and ornithology as connected with agriculture and horticulture.

Entomology, as a useful science, and to be practicable where most needed, must be placed before those whom it is to benefit in a language which they can understand, and in intimate connexion with the objects of their daily interest and care. Hence the great importance attached to perfecting this system of ocular instruction, and hence, also, as far as possible in this report, terms recognized as peculiar to pure science are avoided; the aim being to come at once to facts in plain words—to talk with the farmer where he lives, and show him by the results of actual investigation wherein his safety lies. Since the opening of this museum every effort has been made, and much private capital spent, to add to it everything desirable that came within reach, besides giving the free use of my own library and collection of birds, insects, insect-plates and model fruits, for the benefit of all coming here for information.

The voluntary contributions for the year, as will be seen by the list appended, though not as numerous as might have been wished, have still added much to the interest of the collection. As no funds have been appropriated for the purpose, many of the skins of birds and animals sent by correspondents from the west have not yet been mounted, and therefore do not appear on exhibition. One of the most successful collectors of specimens, and one to whom the department owes many thanks, is Mr. Allen Crocker, of Kansas. A like attention from others would soon enrich the museum with all that is desirable in the way of natural history.

The insects sent for identification have been almost countless, though comprising few that are new; many, however, are interesting from facts and observations connected with them, as mentioned by correspondents.

Letters of inquiry in regard to insects, their depredations, and the best methods of prevention, have been very numerous from all parts of the country. These have all been answered promptly, and with the request repeated from last year's report, that farmers who try the remedies there proposed for the destruction of noxious insects would report to this department the results of those trials, so that the successful ones may be registered for future use, and the useless ones be thrown out of print as soon as may be. As yet this request has scarcely been heeded, owing, probably, to the fact that the limited number of reports allowed to the department for distribution did not permit of its being put into the hands of multitudes who would have taken deep interest in helping in this work. Hundreds of disappointed applicants, both personally and by letter, from the working and experimenting classes of farmers, attest the truth of this. It is among them that the documents of this department should be freely distributed, as it is from them we are to obtain the facts most needed to guide science in her mission of usefulness.

The cereals received since last report have been very few, and, with one two exceptions, not of extraordinary quality. California, Oregon, and Colo have sent some small samples of very beautiful wheat, and some fine oats, ley, and rye.

The interest in fibres has continued unabated. Specimens have come in f nearly every section of the country, but only in small parcels, simply to show the variety of fibre-producing plants at our command. Fine cottons have been sent from California and the Sandwich Islands, where large quantities were raised in 1865.

Several of our consuls at foreign ports have interested themselves in coll ing and forwarding to this department articles of value, among which y mentioned the fine case of China grass, (*Bœhmeria nivea,*) and the a fibre, yarns and fabrics of the same, from the manufactory of Messrs. Waru Sons, Bradford, England, through G. D. Abbott, esq., United States consul at Sheffield. The fineness and toughness of this fibre, together with its beautiful lustre, promise to make it a valuable addition to manufacturing materials. A correspondent writing from London, England, says of it: "The experiments in the cultivation and manufacture of the plants, made by Colonel Nicolle, in the island of Jersey, enable him to state with entire certainty that the yield of China grass per acre is as great as lucerne, or about forty tons of green matter, of which eighteen tons yield one ton of fibre. The plants attain great perfection in the climate of Jersey, which is very similar to that of Maryland."

The *Phormium tenax,* or New Zealand flax, is also highly spoken of by the same correspondent, successful experiments having been made in the manufacture of cloth and rope therefrom. Small samples of these have been received, and are now in the museum.

Some fine specimens of Spanish merino pure and graded wools have been received from California. From other States very little has come in, and, indeed, it is at present quite as well so, as, in the crowded condition of our rooms there is no place in which they could be safely kept. Nearly all the parcels of wool that were on hand at the organization of the museum, with many since received, have been destroyed by moths, which it has been impossible to prevent for want of air-tight cases and proper fumigating apparatus. Until such safeguards are provided, it will be with the greatest difficulty, even with the constant use of benzine, that the mounted specimens now in the collection can be preserved; and wool in parcels being peculiarly liable to the depredations of the moth, cannot be kept any length of time without proper protection, such as the means now at command do not afford.

The museum is indebted to J. H. McNall, esq., of North Star, Pennsylvania, for a skin of a pure-bred Angora goat, and also to B. K. Tully, esq., of Russellville, Kentucky, for one seven-eighths Angora, both of which have been mounted and are on exhibition, together with some fine samples of Angora wools of various grades.

Through V. D. Collins, esq., now in China, we have received a number of cases of insects peculiar to that country, with a variety of papers, fibres, models of farming implements, irrigating machinery, and other articles, many of which, however, are mere matters of curiosity.

The department is under obligations to Messrs. Vilmorin, Andrieux & Co., celebrated florists of Paris, France, for a full set of the beautiful colored plates of flowers and vegetables, comprising the "Album Vilmorin," and also for a variety of seeds of rare flowers for propagation in the department garden.

Our collection of silk in cocoons and reeled samples has been increased by valuable contributions from the Bohemian Agricultural Society, through the Austrian minister of commerce, and also from M. Guerin Meneville, of Paris, who presented a choice variety to me for that purpose during my late visit to France.

regard to experiments made in this country with the *Attacus cynthia,* ıinese Ailanthus silk-worm, there seems very little to be said that is en- ging. The eggs and cocoons of the insect were widely distributed through- ıe country, but the reports from them have been very meagre. Some who written state that the worms when hatched were totally neglected, and so hed. From only one correspondent have we a satisfactory account. Mr. Akhurst, of Brooklyn, New York, writes under date of November 21, as follows:

received last spring thirty-six cocoons of the Cynthia, with the request I would report to you my success at the close of the season. I am pleased that, so far, all is extremely favorable. From the thirty-six cocoons I reared upwards of 10,000 cocoons. The greater number were reared in pen air, many in the most exposed situations. Still I found them to thrive kably well.

fact is proved beyond a doubt, that two broods can be reared with cer- y within one season. The second brood of this season proved stronger, he cocoons much larger than those of the spring brood.

The Rev. Dr. Morris, of Baltimore, in his paper of 1861, says, 'about ten ent. of the first brood hatch during the summer.' In this there is a great ke. I find from seventy-five to seventy-eight per cent. made their appear- although I had them in a very cool place.

There remains no doubt in my mind of the success of the experiment, and ieve that with very little care and expense great quantities of silk can be l in this country. I shall continue to rear the Cynthia next season, and eport my success, whatever it may be."

ıe cocoons of the Cynthia which I kept for myself produced fine, healthy s, which, after pairing, laid their eggs upon the inside of the box in which were kept. The eggs hatched well, and in due time the cocoons were spun, g only about eight or ten per cent. of the caterpillars. Unfortunately for ext brood, I was obliged to go to Paris, and had to leave the cocoons in of another person, who reported that several moths came out and laid eggs, ıe worms when hatched proved sickly, refused to eat, and so died without ıg cocoons.

e simple question as to whether the Cynthia can be acclimated here, and nake silk from the ailanthus, no longer admits of doubt. Mr. Gallaher, of ity, has succeeded in reeling the cocoons, and finds the silk even, of fine re, and good strength. A specimen reeled may be seen in the museum. ıtility of the Cynthia here, or, indeed, the practicability of silk-raising at any extent in this country, with labor at its present price, is the real ques- f doubt, and that is not left with individuals to settle, but with the laws ı control commerce and regulate demand and supply.

perfecting the system of instruction upon which this museum is based, cases covered with glass have been procured, in each of which are ar- d the various fibres, silks, &c., beginning with the seed and going through ifferent stages of growth and manufacture, so that the whole process may ın at a single glance. This is found peculiarly advantageous in giving nations, and is very satisfactory to those seeking to inform themselves in l to any product and its uses. In short, the entire collection is intended object library of reference for all time; the design being, if permitted and raged to go on with it, to have all the economic products of our country ıented here and so arranged, and to make the collection such a centre of use- ormation, that the department cannot afford to do without it. A national ım of this kind is demanded by the needs of the people; and the system, at ninute in detail and comprehensive in scope and aim, upon which the nucleus ed, is capable of being extended through every branch of husbandry and

manufactures. It is, in fact, the initiatory chapter of a boundless volume of national industry illustrated.

If proper rooms and cases could be provided, the wool interests of the c try might be largely subserved by adding to the few mounted specimens now hand such of the pure breeds of sheep and their crosses as are most desirable, and by having connected with them books or cases in which could be preserved the grades of each with other breeds, showing the quality of staple, and for what use it is best adapted. This, it will be seen, would be but the beginning of an almost endless series representing the industrial arts arising from and connected with agriculture. Animal as well as vegetable products, with the changes incident upon breeding, growth and manufacture, should be included in this cabinet.

Domestic fowls, of which we have a small collection, should be better represented by true types of the pure breeds, few of which can be had without resorting to importation. When in England recently, I ascertained that most if not all the best varieties might be obtained pure and at reasonable rates from eminent breeders there, and would suggest that measures be taken to procure them as soon as facilities can be afforded for preserving them properly.

The model fruits, of which there are now nearly 3,000 specimens on exhibition, are classified and so arranged as to show the effect of soil, climate and culture; a catalogue, specifying the history and quality of each, being kept for reference. The design is to obtain from each State samples of the various fruits which have been tried and proved, to have them modelled here, retaining one copy to be added to this national collection, and returning duplicates and matrices, correctly named, to each State agricultural society. These models are fac-similes, and are of a durable material, not affected by temperature, and capable of bearing transportation and any amount of handling.

Intimately connected with the fruits are the insects, of which there is a large collection classified, mounted, and conveniently arranged, at the command of all asking for information, besides a great number of colored plates prepared by myself, showing the different forms in which the insects appear, with their names, and references to authors who have treated of their habits and the best methods of destroying them. There is also a carefully prepared list of the vegetable productions injured by insects, alphabetically arranged, with the names of insects feeding upon each, and whether in the larva or perfect state. The list and the plates together form an illustrated cyclopedia, where, the plant or fruit being found, the insect enemy is at once discovered, and, by reference to the engravings, can be seen in all its forms.

The birds mounted in the museum number nearly six hundred, the greater part of them being insectivorous birds of this country. A knowledge of their nature and habits is of as much importance to the farmer and fruit culturist as is the science of entomology; hence the two studies are combined by attaching to each bird a card on which is stated, not only the scientific and common name, with reference to works on ornithology where their history may be found, but also the habits and food peculiar to each, so that the farmer may know his enemies from his friends. In addition to this, the contents of the stomachs of birds, taken at different seasons of the year, have been preserved, and are placed in small boxes beside the specimens, so that they may be referred to at any time.

The following brief synopsis of the number, character, and habits of the birds examined and preserved in this department since last report, will be of interest to the farmer:

Commencing with the birds of prey, we find the turkey buzzard and black vulture both exceedingly useful in devouring offal and dead animals, which would otherwise contaminate the atmosphere.

Hawks are, in general, very injurious to the interests of the farmer, by de-

ng not only poultry but the small insectivorous birds; at the same time, kill immense numbers of mice and insects, and thus partially atone for the ge they do. In proof of this, a sparrow-hawk, shot in October, among a of reed or rice birds, was found to be filled with grasshoppers, and con- l not the slightest vestige of feathers or bones of birds. This bird was kably fat. A red-shouldered hawk, or winter-falcon, shot in November, ound filled with crickets and grasshoppers, although its usual food appears small birds, animals, frogs, &c. Wilson states that they will even attack .

e rough-legged falcon destroys mice, frogs, and reptiles, but also preys on er birds and animals. The marsh hawk, or hen harrier, destroys great ers of field mice, reptiles, and small birds. Taking the hawks together, lamage they do in destroying poultry and insectivorous birds is by no s counterbalanced by their good deeds in ridding us of mice, insects, rep- &c.; and they may be classed as decidedly injurious to the agriculturist. gles are very injurious, by destroying lambs, young animals, and the r game birds; but as the fish hawk lives upon fish alone, and never mo- other birds or animals, it ought to be excepted from the general condem- n passed upon the rest of the hawk species.

e owls being nocturnal birds, feed principally upon rats, mice, beetles, birds, and sometimes even fish. The large owls, such as the great horned t-owls, are very destructive to chickens, quails, and squirrels, although they do some good by destroying rats and mice. The barn owl kills immense ers of rats, mice, and shrews, but also kills small birds. The mottled ed or little screech-owl feeds on mice, insects, and small birds. The short ong-eared owls feed principally on rats, mice, and beetles. The stomach e specimen of the long-eared owls in the collection contained the skulls bones of at least eight field mice, and therefore, when about barns and ries, these birds must be very useful. Poultry, rabbits, and birds are de- ed by the barred owl, and it also feeds on rats and mice. The large snowy which is occasionally seen in Maryland and other middle States in winter, on grouse, hares and fish; one kept in confinement appeared to prefer fish y other diet.

the second order, *Scansores* or climbers, we begin with the cuckoo or rain These birds are very useful in destroying caterpillars, beetles, and insects neral. Nuttall states that when they have young to provide for, their food sts chiefly of hairy caterpillars rejected by other birds, that so commonly apple-trees, and live in communities within a common silky web." The h of a specimen shot in New York was found literally crammed sharp-spined caterpillars of *Vanessa antiopa*. But although these birds us useful, they seek and destroy the eggs of other birds. In one instance, attacking the nest of a robin, the parent bird made such a resistance, and o much engaged in fighting the cuckoo, that both were taken alive by a tor. Unlike its European relative, our cuckoo makes its own nest, and is y careful and attentive parent. Our cow blackbird, or cow-bird, on the ry, like the European cuckoo, lays its egg in the nest of almost any other bird.

e woodpeckers are, in general, very beneficial to the orchardist, by de- ng the larvæ of beetles, which, if left undisturbed, would probably kill the in ted by them. The stomach of a specimen of the downy woodpecker, s called sapsucker, (from the erroneous impression that it sucks the sap shot in February, was filled with black ants. This bird is said to be ous by making perforations around the trunks and branches of orchard in regular circles, probably to taste the sap, or feed on the young wood. ll states, however, that "trees thus perforated are not injured, but thrive ll or better than those imperforated." On one occasion a downy wood-

pecker was observed by myself, making a number of small, rough-edged perforations in the bark of a young ash tree, and upon examining the tree when the bird had flown, it was found that wherever the bark had been injured the young larvæ of a wood-eating beetle had been snugly coiled underneath, and had been destroyed by the bird; thus proving conclusively to my mind that these perforations are made for the purpose of finding insect food.

The stomach of the pileated woodpecker, or black woodcock, was found in October to be filled with the seeds of wild berries, with no insects whatever; its principal food, however, consists of wood-boring larvæ and insects, and it has been accused of eating maize. In the stomach of the red-bellied woodpecker, killed in December, were found pieces of acorns, seeds and gravel, but no insects. Another shot in December contained wing cases of *Buprestis*, and a species of wasp, or *Polistes*, acorns, seeds, and no bark. A third, shot in May, was filled with seeds, pieces of bark, and insects, among which was an entire *Lachnosterna*, or Maybug. The yellow-bellied woodpecker has been accused of feeding upon the young bark of trees, and although Nuttall states that "their principal food is insects, for which they sometimes bore the trunks of orchard trees," it seems not yet satisfactorily settled as to whether its chief food is the bark itself or the insects under the bark. Having had no opportunity to examine the stomach of one of these birds, I am unable at present to answer this question. A piece of bark injured by this bird, sent to the Smithsonian Institute, was certainly eaten out regularly in large square or round holes, as if for the sake of the young bark or wood itself. Dr. Trimble states, however, that the stomach of a yellow-bellied woodpecker contained two seeds, seven ants, one insect like a chinch, and of bark and sap not one trace. Another specimen contained pulp of apple and one ant. Pieces of bark and wood are frequently found in the stomachs of all woodpeckers, but they have probably been merely swallowed with their insect prey, and not for the sake of nutriment. The question as to whether the yellow-bellied woodpecker does really feed upon bark can only be decided by dissecting the bird, observing the structure of the tongue, whether it is barbed, as with other insect-eating woodpeckers, and examining the contents of its stomach at all seasons of the year.

The red-headed woodpecker, in May, contained gravel, small, wood-eating insects, and *Iulidae*. Another shot in May was full of beetles, pieces of bark, seeds, one or two specimens of *Lachnosterna*, or May bug, and other small insects. They are said to be partial to maize when in its milky state, and sometimes also to injure fruit.

The flicker, high-hole, or golden-winged woodpecker, shot in spring, contained a mass of small, yellow ants, with the remains of one small plant-bug. These birds feed, however, on cherries, grapes, and other fruits, and are very partial to ripening corn, and it is therefore probable that they do more damage to our crops than they do good by destroying insects.

We find our most useful allies in the third order of birds, the *Incessores*, which includes all perching birds. The first in this order is the humming-bird, which is generally supposed to live on the honey of flowers, but the stomach of a male humming-bird, dissected by myself, contained some very small spiders, and in others were found the remains of very small insects and spiders.

The chimney swallow, or swift, is very useful, as it feeds entirely upon gnats, mosquitoes, and other small insects found flying in the air. The stomach of one dissected contained nothing but a mass of pulp composed of the remains of soft bodied insects.

The whip-poor-will feeds entirely on large night-flying insects, such as moths and beetles, and should be protected.

The poor night-hawk, under the popular name of bull-bat, although destroy- myriads of noxious insects, meets a most undeserved fate. The young

sportsmen of the south ruthlessly slaughter them by hundreds as an article of food, little thinking that they are killing their best friends.

The kingfisher we will pass over, as his food consists principally of fish, although he also occasionally takes insects floating on the water.

The king-bird, tyrant fly-catcher, or bee-martin, as it is called in the south, feeds upon beetles, grasshoppers, and insects in general. It has been accused by many naturalists of feeding upon honey bees; others state that it selects only the drones. In defence of this bird, I will state that the stomach of one examined in May contained May bugs, but no bees; and another shot by a farmer, who suspected it of taking his bees, as he had seen it make repeated dives among them from a willow overhanging his hives, contained no less than fifteen *anomala varians*, one *carabus*, and not the vestige of a bee. These insects were so packed together and mixed up in the stomach, that an inexperienced person would have taken them for a mass of bees; and it was only after careful and close examination that they were all identified. This bird may, however, feed upon bees at some particular seasons; and if farmers would only carefully examine the stomachs of such as are killed, or send them for that purpose to some competent naturalist, the question would soon be settled as to whether it ought to be shot as a marauder upon bee-keepers, or protected as a benefactor of farmers. In the southern States I have seen the bee-martin chase and capture the boll-worm moth not ten paces from where I stood.

A great-crested fly-catcher, in May, contained small hymenopterous insects and beetles. The pewee fly-catcher, or phœbe bird, so called from its peculiar note, shot in March, contained seeds of wild plants, and small insects. Two shot in April contained numerous specimens of *Aphodius maculipennis*, *Fimetarius*, and other small insects; and another shot several years ago near a bee-hive contained a mass of the striped bug so destructive to melons and cucumbers; thus proving how beneficial these small birds are to the gardener. A wood pewee, shot in September, contained a mass of soft-bodied flies, among which was a perfect specimen of *Musca Cæsar;* whilst a yellow-bellied fly-catcher had fed entirely upon *Aphodii* and other small insects.

We now come to the family of Thrushes, the most remarkable and best known of which is the robin. It is true that this bird devours great quantities of our small fruits, such as cherries, &c., but we should remember that during the rest of the year the robin is busily engaged in destroying insects and larvæ which would otherwise ruin our crops. A robin shot in March contained spiders, several noxious insects, and seeds of wild plants; another shot in the same month, in a newly ploughed field, was found to contain the nearly full grown larvæ of a cicada which had no doubt been turned up by the plough.

I will remark here that in regard to this family of birds, and, indeed, of nearly all others as well, I cannot make this report as full and complete as it should be, on account of the stringent laws here (in Washington) prohibiting the shooting of small birds. So conscientiously law-abiding were the officials, that I could not even get a permit to shoot specimens for examination preparatory to making this report. Yet, notwithstanding this, the markets here in spring are literally overstocked with strings of robins, thrushes, cedar-birds, and even bluebirds, which are brought in and sold for food. Until this public sale of small birds is prohibited, as with game birds at certain seasons, our little harmless songsters will rapidly disappear from the neighborhoods of large cities.

The stomach of a hermit, or little thrush, was found filled with seeds of the *smilax rotundifolia*, although its general food in spring and summer consists of insects. The well-known and favorite bluebird is exceedingly useful to the horticulturist and farmer, by destroying myriads of larvæ and insects which would otherwise increase and multiply to the great injury of vegetation. A bluebird, shot in March, was found to contain grasshoppers, while a naturalist searching for them in the same field could not find a single specimen. Another

in the same month contained large cut-worms and various small insects; and a third was filled with small beetles, *Aphodii*, &c., and some wild seeds. Small boxes put in the trees, or around the dwelling-house, will invariably attract bluebirds to build in them. They are sometimes turned out, however, by the small and more pugnacious wren, which, after driving off the rightful occupant, leisurely turns out the eggs, barricades the entrance, and takes possession. I have known a favorite bluebird build in the same box several years in succession, and become so tame as to have no fear of the persons or animals on the premises; and was fully convinced of its utility by observing the numbers of caterpillars and insects it carried to its nest to feed its young.

A tit-lark, shot in March, from a large flock which were busily employed in hunting over a grass field, was found to contain a half-grown grasshopper, several *Iulidae*, and small insects.

The Maryland warbler, or yellow-throat, frequents sandy situations and feeds mostly on insects. In one, shot in September, was found nothing but the remains of insects. Indeed, all the warblers, during their summer and fall residence in the northern and middle States, are ever on the search for insects, and destroy numbers of the smaller ones which are too insignificant for the farmer to observe, yet which do more real damage than many of the large ones daily coming under his notice. A golden-crowned thrush contained, in May, nothing but such small insects; and a yellow-rumped warbler had fed principally on small dipterous or two-winged flies.

In the stomachs of each of three scarlet tanagers, or black-winged summer redbirds, shot in April, were found only grasshoppers, beetles, and flies; and, as another contained two *curculionidæ*, *Epicærus fallax*, no doubt if left undisturbed they would destroy the much-dreaded curculio. One summer red-bird contained nothing but seeds of wild plants, although Nuttall states that "bugs, beetles, stinging bees, flies, and cynips of various kinds also make part of their repast."

Swallows and martins are exceedingly useful in destroying small insects when flying in the air, and thus help to keep down the multitudes of gnats, mosquitoes, and small flies. By one naturalist it has been urged against them that they also feed upon the ichneumon flies, which are destructive to insects; but the damage they do in this way is more than compensated by the benefits they confer by devouring hordes of noxious insects.

The cedar or cherry bird is very destructive to small fruits, and the fruit-growers cannot be blamed for shooting these voracious birds, as, if undisturbed, they will entirely strip his cherry trees. In the autumn, however, they feed upon insects, and Nuttall states that "before the ripening of their favorite fruits, the cherries and mulberries, they repay the gardener for the tithe of his crop, by ridding his trees of more deadly enemies which infest them, small caterpillars, beetles, and various insects then constituting their only food. For hours at a time they may be seen feeding on the all-despoiling canker-worms which infest apple and elm trees." Those shot by myself before the fruit season were almost always filled with seeds of the red cedar and other berries, and no insects whatever. However, as Dr. Trimble states that one cedar bird dissected by him contained thirty-six canker-worms, we may give the bird a little credit; though I very much doubt whether the worms and insects it destroys will repay for the fruit taken.

The shrikes, or butcher-birds, sometimes also in some parts called the French mocking-bird, feed upon insects, such as grasshoppers and crickets. This bird has a curious habit of fastening its prey upon thorns and leaving it uneaten. I have frequently seen grasshoppers impaled in this manner, and thus knew that the bird was in the vicinity. They also feed upon small birds, and one frequented a barn the whole winter for the shelter, and for the sake of the mice in the neighborhood, upon which it fed.

The mocking-bird is accused, and with great truth too, of destroying grapes and other small fruits in the southern States. It is sometimes most ruthlessly destroyed in spite of its melodious song; yet I have seen a female mocking-bird feeding her captive young almost entirely with insects, among which were numbers of the cotton boll-worm moth, so destructive to the crops of the south.

The catbird has very nearly the same habits as the mocking-bird, and though it destroys immense numbers of worms, caterpillars, and insects in general, will make too free with the small garden fruits. One catbird, shot in September, was filled with the seeds of wild berries, as was also a brown-thrush or thrasher. As all these birds have similar habits, it is left to the horticulturist to judge whether the fruits they destroy are not more than paid for by the havoc they make among the noxious insects in early spring, before fruit ripens.

The great Carolina, or mocking wren, properly so called, as it almost rivals the mocking-bird in its powers of imitation and song, feeds almost altogether on insects. One shot in Maryland was found to have fed entirely upon them. The stomach of the common house wren, in May, had in it a large cut-worm, and several smaller insects. The wren, like the blue bird, will build in boxes put up for that purpose, and, if encouraged in gardens, is one of the greatest benefactors of the horticulturist. I once took the trouble to notice the frequency of the wren's visits to the nest, and found that at least once in five minutes one of the pair entered the box, and never without a caterpillar or some insect in its beak for its young. Taking only ten hours as an average of the time spent by the birds per day in this work, and not counting the insects they consumed themselves, there were at least one hundred and twenty, and that at a season of the year before they had begun to multiply. Wrens and bluebirds, however, do not agree well together, the wren almost invariably turning the bluebird from the box to find new quarters.

In two specimens of the white-breasted nut-hatch were found pieces of bark, mixed up with wing cases of beetles and one large larva. These birds are often incorrectly called sapsuckers by farmers; indeed, this name appears to be indiscriminately used when speaking of either the small woodpeckers or the nut-hatch. A large gall upon a branch is now in the museum which has been opened in several places by this bird and the larvæ extracted, thus showing its industry and perseverance in search of food. A red-bellied nut-hatch, shot in April, contained among other insects a perfect *Rhagium lineatum*, the larva of which lives under pine bark.

The small black-cap titmouse, or chickadee, is also very beneficial by destroying the eggs of minute larvæ in the same manner as the golden-crested wren. One shot in winter was full of small larvæ and insects which live or hybernate in the crevices of the bark of trees. The tufted titmouse is somewhat musical, and feeds upon insects.

The purple finch, or American linnet, in the spring, feeds upon the expanding buds of trees. On one occasion, when there was a light fall of snow, I found the ground under some peach trees literally strewed with the buds torn open by the strong, sharp bill of some bird, and the stamens and pistils eaten out. On shooting some birds found at work on the trees, they proved to be the purple finch, and their stomachs were completely filled with stamens and pistils of the peach buds. One branch examined had at least two-thirds of the buds thus destroyed. There is no doubt that this bird is, in many cases, the cause of much injury to fruit crops. At the same time Nuttall states that, in summer, their principal food is insects and juicy berries.

The yellow-bird, or American goldfinch, feeds principally upon seeds, and frequently does much damage in gardens by eating lettuce, salsify, and other seeds. Nuttall, however, says that their usefulness in other respects (by eating the seeds of noxious weeds) far more than counterbalances the trifling injuries they do. Of this the gardener must judge for himself. Those shot as specimens

were found always to have eaten seeds, and mostly of the lettuce and other garden plants. One author states that they destroy great numbers of the larvæ and pupæ of the wheat midge, improperly called the red weevil, so injurious to wheat.

The crossbill is merely a visitor to the middle States during the winter, and feeds chiefly upon seeds of the pine and hemlock, but also does considerable damage to the orchard in more northern regions by tearing open apples for the sake of the seeds. Those shot as specimens contained merely seeds of the pine. The lesser redpole, likewise a winter visitant, feeds also on seeds.

The buntings and sparrows come next in order, the first of which is the snow bunting. This only visits the middle States during extremely severe winters, and feeds upon insects and seeds. All the sparrows are more or less useful, as their food consists chiefly of insects and seeds of noxious weeds. Several of them, such as the snow-bird, may be seen always when the ground is frozen, hunting for small seeds of weeds, and for hybernating larvæ and insects.

The cardinal grosbeak, red-bird, or by some called the Virginia nightingale, feeds upon seeds, and has been accused of destroying the seeds of orchard fruits. Nuttall says, "they are said occasionally to prey upon bees." Those shot, however, were found to contain only wild seeds.

The towee finch, or ground robin, frequents dense thickets near water, and is said to be particularly fond of *Iulidæ*. It also feeds upon worms, larvæ, and seeds. The stomach of a specimen shot in June, was filled with various insects and seeds of weeds.

The bob-o'-link, or reed-bird of the middle States, and rice-bird of the south, is exceedingly destructive to rice in Carolina and Georgia; yet, when in the more northern States, feeds partially upon insects, and is fond of seeds of dock, dandelion, and grass. Dr. Trimble also states that they destroy canker-worms. Those shot as specimens, in spring, were found to contain seeds, grasshoppers, and other insects.

The troopial or cow blackbird never builds a nest for itself, but deposits its eggs in the nest of some other smaller bird, and, like the European cuckoo, leaves its young to the charge of foster parents. These birds live upon seeds and insects.

The swamp blackbird, formerly known as the red-winged blackbird, does great damage to corn or maize; but during the spring I have always found their stomachs filled with worms, larvæ and insects, mixed with seeds of wild plants. Wilson remarks, "as a balance against the damage they do, there is the service they perform in the spring season by destroying immense numbers of larvæ, which are of kinds most injurious to farmers." Kalm states, that "after the great destruction made among the common blackbirds for the legal reward of threepence per dozen, the northern States in 1749 experienced a complete loss of grass and grain crops which were devoured by insects." A southern planter once stated to me that the cotton-boll worm, which was destroying his cotton crop, had entirely disappeared after the visit of an immense flock of these or some other blackbirds, which, after devouring the worms, immediately left the neighborhood. It is therefore for the farmer to judge whether they do not deserve the toll they take from his crops, for their spring services in destroying his enemies.

The meadow lark, or American starling, is exceedingly beneficial as destroying immense numbers of larvæ, worms and insects in the cultivated fields. The stomachs of all examined were full of insects and small seeds. One shot in March contained nothing but beetles and other insects, and gravel. As it is not known that this bird eats fruit, it may be considered a decided friend to the farmer.

The sprightly and gay-colored Baltimore oriole, golden robin, or hanging bird, as it is often called from the singular pendant nest it forms, feeds upon insects.

Nuttall says, "they feed their young usually with soft caterpillars which they swallow, and then disgorge on reaching the nest." These birds, however, do considerable damage to the pea crop, by splitting open the pods and eating the young peas. It has been suggested that this was done merely to find the larvæ of the destructive pea bug, which lives in the seed. They are accused of taking cherries and other small fruit, but are said in Dr. Trimble's book to eat the curculio, or destructive plum weevil. If this is true, it would atone for any slight fruit-eating propensities they may have. I would observe here, however, that I have never found the plum weevil in the stomach of any bird; and that the nearest approach to it was *Epicærus fallax*, found in the stomach of a scarlet tanager.

The stomach of a rusty blackbird, examined in April, was found to contain snake milipedes in great numbers, worms, caterpillars, and gravel. The crow blackbirds, examined in early spring, before corn was planted, were found to have destroyed numberless noxious insects. Nuttall says, "up to the time of harvest I have uniformly, on dissection, found their food to consist of larvæ, caterpillars, moths and beetles, of which they devour such numbers that, but for this providential economy, the whole crop of grain in many places, would probably be destroyed by the time it began to germinate." But as the damage done to maize by this abundant and destructive bird is in some places almost incalculable, it is no wonder that the farmer renders a verdict against its race, and exterminates them when and wherever he can. At the same time it should be considered, that a mischievous bird is much sooner found and destroyed than the myriads of noxious insects upon which it preys.

We now come to the common crow, a much slandered and persecuted bird, on account of his pilfering propensities in the cornfield. Before condemning him here to certain destruction, let us hear the other side of the question, and consider the great good he does in waging war upon the cut-worms, grubs, and other noxious insects which, if undisturbed in spring, would quite destroy the crops. In regard to the seed-corn which he pulls up and eats, many farmers state that they have always observed that the young corn thus destroyed had almost invariably a cut-worm or other insect preying upon its roots. This may or may not be so; but this bad habit of pulling up seed-corn may be easily remedied by tarring or sulphuring the seed before planting. Some farmers leave a little corn on the surface for the crow to eat; but this most probably would only attract him to search for more. No farmer, when ploughing in spring, can have failed to observe the crows and other birds following in the furrows, and busily engaged in searching for grubs and cut-worms. If shot at this time, they will be found filled with a mass of worms, caterpillars, grubs and other injurious larvæ and insects. Now we must consider that these insects, if left undisturbed in spring, would multiply and spread in the autumn to such an extent that it would be utterly impossible for man to find and destroy even a tithe of them; while, should the crows increase so as to become a nuisance, they may be much more easily discovered and killed. Farmers will abuse the bird for being once seen feeding upon their crops; but seldom think of giving him credit for the hundreds of times when he is at work to save them, by devouring their enemies. A planter in South Carolina informed me that he had seen crows attacking the maize standing in his field, and upon examination the husks were found torn open and much of the unripe corn scattered on the ground; but upon looking closer, every ear of corn thus injured was discovered to have been partially destroyed by the corn-worm, *Heliothis armigera*, and the worm had been taken out and devoured by the bird. Crows are, however, very destructive to small birds, eggs, and to almost anything they can overcome, and, upon the whole, during summer and autumn, are serious pests to the farmer. Indeed, it is hard to estimate whether the good they do is not counterbalanced by their mischievous propensities.

There is a smaller species of crow found along the sea-coast, called the fish-

crow, which, it is said, does not injure maize, but feeds entirely on fish, berries and insects, and Nuttall states are therefore "rather friends than enemi '

The food of the blue jay consists of acorns, berries, maize, orchard fru sects and caterpillars; but as it has the very bad habit of searching for the of small birds, eating their eggs, and even devouring the unfledged young whenever it finds an opportunity, it may well be doubted if this bird ought to be classed among those which are beneficial to the farmer.

The order *Rasores* comprises the pigeons, turkeys, grouse, quails, &c.; and of the habits of these the farmer is able to judge for himself, as well as of their uses. The ruffed grouse, or pheasant of the middle and western States, and partridge of the north, however, sometimes does much damage to orchards by devouring the buds of apple trees. In the stomach of a prairie hen, or pinnated grouse, from the west, were found fifty-six grains of maize, besides a quantity of oats, buckwheat, catkins, and the seeds of wild plants—proving the voracity of these birds, and showing what quantities of grain they destroy.

The American partridge, or quail, is said to be very useful in grain fields, by feeding upon the seeds of hurtful weeds during the autumn and winter. In the Cincinnatus, an agricultural journal published in Cincinnati, is an article stating that "in the crop of a quail, shot in a cornfield, was found one cut-worm, twenty-one striped vine-bugs, one hundred chinches, and a mass consisting of hundreds of chinch-bugs, but not one kernel of corn." If this be correct, it goes far to prove the quail the farmer's friend.

The order *Grallatores* comprises the cranes, herons, bitterns, plover, woodcock, snipe, &c. These birds are all more or less beneficial to the agriculturist, by destroying reptiles, slugs, insects, &c., and, as they do not injure his crops in the least, ought to be protected as much as possible. A tame sand-hill crane I had in Florida exhibited extraordinary sagacity or instinct in finding grubworms under the green sod, where I could not procure worms to fish with, and where there was not a vestige of injury to the grass. When he once commenced digging with his strong and sharp bill he never failed to find the insect hidden underneath.

A killdeer plover, shot in May in a wheatfield, contained nothing but beetles, worms, and small insects. Herons, bitterns, &c., do certainly destroy great numbers of fish and frogs, but at the same time they feed equally on small noxious quadrupeds and reptiles; and as this paper is intended for farmers and not for fishermen, we will not discuss the subject further.

To the order *Natatores* belong swans, geese, ducks, &c.; and as these are well known, they need not be further described. I will merely remark that several gulls and sea-swallows, or terns, feed upon insects as well as fish; and in England I have seen them busily hunting for their insect-food in fields some distance inland.

Among the birds which have been introduced from abroad into this country, for either their song or their utility, may be mentioned the field lark of Europe and the European house sparrow. The last-named bird would certainly do much to rid our cities of the disagreeable span-worms infesting the shade-trees. At the same time there is no doubt that the smaller fruits and the wheat in the vicinity would suffer to a considerable extent. The question, therefore, arises whether citizens would be willing to sacrifice their fruits for the sake of being rid of span-worms and caterpillars. In Philadelphia the great increase of span-worms was doubtless attributable to the decrease of small insectivorous birds in the parks; this decrease being caused by the introduction of squirrels. However graceful, nimble, and ornamental these little animals may be in the public squares, they can only be kept there at the expense of the birds, as they destroy the eggs, and the birds themselves when they can catch them, their constant persecutions causing those not killed to migrate to safer places.

Some persons in England contend that sparrows are much more injurious than

ial, and have caused them to be killed with gun and strichnine. In regard e birds and rooks, I quote below from Anderson's Recreations in Agri- : "Were it not for the birds that frequent our gardens, and insects which pon each other, the number of these diminutive creatures produced would ı as soon to overpower the industry of man, and put an end to his miser- :istence. The ingenious Dr. Bradley has computed that a pair of spar- arried to their young, in one week, not less than three thousand three d and sixty caterpillars, at which rate, in the course of three months, this would consume 43,000,680 caterpillars. Let any one compute the damage ese caterpillars, and the infinite progeny that must have issued from them, have done in that period had they been permitted to get into their winged ınd he will then see reason to doubt how far we do wisely to exterminate birds, because of the tasting they take of our grain and fruit when they urity. It has often been remarked that after an extensive rookery en eradicated on account of the damage it did to the cornfields in the orhood, those fields, both of corn and grass, have been so infested by as to yield crops much inferior to those which had been reaped from the ields while the rooks were there; for it is well known that these creatures fond of grubs as to prefer them to every other kind of food, and are, there- ı perpetual search of them, picking them up and devouring them in im- multitudes."

Florent Prevost, who collected and examined the stomachs of European or several years, comes to the conclusion that, from his researches, "birds general far more useful than hurtful to the agriculturist, and that the ef done at certain periods by the graniverous species is largely compen- y the destruction of insects they effect at other periods."

TOWNEND GLOVER.

. Isaac Newton,
Commissioner of Agriculture

REPORT OF THE CHEMIST OF THE DEPARTM OF AGRICULTURE.

WASHINGTON, D. C., *July* 1, 18

SIR: I have the honor to submit to you the following report of analy during the year, and the kind of work performed in the chemical lal the department.

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1. QUANTITATIVE ANALYSIS OF A MARLY SOIL FROM VIRGINIA.

Organic matter and moisture	
Peroxide of iron and alumina	
Carbonate of lime	
Carbonate of magnesia	
Potassa	
Soda	
Phosphoric acid	
Sulphuric acid	
Soluble silica	
Insoluble silicates	
Total	1

2. ANALYSIS OF THE SUGAR-BEET.

The juice was expressed with a hydraulic press. The method of deter tion employed was that by Fehling's copper test, a short description of will be appended to the analysis. The proportion of sugar in beets First, it is greater in some varieties than others; second, it is greater in than in large beets; third, in dry climates, especially where the climate i after the roots have begun to swell; fourth, in light than in heavy soils; in the part above than that under ground; sixth, when the manure has not directly applied to the crop. The physical characters which serve to show a beet-root is of good quality are its being firm, brittle, emitting a creaking when cut, and being perfectly sound within; the degree of sweetness i a good indication. The 45th degree of latitude appears to be the southern of the successful growth of beet, in reference to the extraction of sugar. (

The beets in question were sent by Gennet Brothers, of Chattsworth, Ill They yielded—

Dry residue	
Cane sugar	
Water, &c	
Total	1

g's method depends upon the property of grape-sugar, at an elevated ıre, and in the presence of an alkali to deprive oxide of copper of one ı oxygen; thus converting it into sub-oxide, characterized by a brown ılor.

liquid is prepared as follows: 34.45 grammes (a gramme is equal to grains, English) of pure crystallized sulphate of copper are dissolved 200 cubic centimetres of distilled water.—(A c. c. or cubic centimetre 'ater is in weight equal to one gramme or 15.434 grains, English, or a : half a drachm fluid measure.) A concentrated aqueous solution of mes neutral tartrate of potassa and soda (Rochelle salts) is then pre l mixed with 480 cubic centimetres of a solution of caustic soda having gravity of 1.14. The copper solution is then poured into this alka- l by small quantities at a time. The whole is finally diluted with dis- ;er until it measures 1 litre, (=1000 cubic centimetres,) at 17.5° Centi- :63. 5° Fahrenheit.) Ten cubic centimetres of this clear violet blue quor require exactly 0.05 grammes (or 0.77 grains, English) of sugar composition, or, which is the same, its discoloration. It will keep for a unchanged if the bottle is well stoppered.

ıe we fill a burette, graduated into cubic centimetres, with the sugary be tested, and add it gradually, drop by drop, to ten cubic centimetres ıe test liquor till the latter has lost its color; what is wanting to make iginal measured quantity of the sweet juice corresponds to 0.05 grammes rains of sugar. The principle involved is this: One equivalent of r grape-sugar is able to decompose ten equivalents of copper vitriol. ivalent of glucose is 180 (its composition being $C_{12}H_{12}O_{12}$.) Ten ı of copper vitriol =1247. The numbers 1247 and 180 are in propor- ı.65 to 5. Hence one litre (= to 1000 cubic centimetres) of copper ıtaining 34.65 grammes of copper vitriol would be decomposed by 5 of sugar, or, as we take $\frac{1}{100}$ part = to 10 cubic centimetres of it for :iment, 5 centigrammes (or 50 milligrammes) of sugar represents the necessary to reduce the copper liquor. To obtain accurate results very .utions must be employed. Under no circumstances ought the sugar o contain more than *one per cent.* of sugar †For example, we bring centimetres of copper solution into a new porcelain dish, and after t with forty to fifty cubic centimetres of distilled water, we heat over .mp nearly to boiling. From ten to twenty cubic centimetres of fresh mixed with ten to twenty times their bulk of distilled water, and by added to the copper liquor until complete reduction takes place, *i. e.*, supernatant liquor is colorless. To reach this point accurately re- ; practice; it is therefore advisable to remove the dish from the fire ; the precipitate (at first yellow) turns intensely red, and to suffer the ettle, when the slightest blue tint of the clear liquid is strongly con- ith the white walls of the porcelain dish. Should we still have our hether to add more sugar liquid or not, we pour a little of the clear o a test-tube, add a drop of juice and apply heat. If there is any ıosed copper left, a red cloud appears. In that case the tube is emptied ish and more juice supplied. Still greater accuracy may be attained ıe of acidulated prussiate of potash, but as those who desire it will guide themselves by some more extended directions it will be omitted ıe result may be calculated as follows: Of course that quantity by ' the sugar solution poured out of the burette into the copper solution

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ıins equals 1 ounce Troy. 5,760 grains equals 1 pound, Troy.
ts use the French decimal system in weights and measures as a ready means of ; calculations.

which it decomposes, contains exactly 0.05 grammes, or 0.77 grains of sugar. Now it is evident that the less of sugar juice required, the greater will be the percentage of sugar, or, in other words, the amount of sugar stands in an inverse ratio to the volume of sugar liquor consumed.

If m (quantity sign) cubic centimetres of juice contain 0 05 grammes of sugar, how much do 100 cubic centimetres contain?

$$\text{Equation: } m : 100 :: 0.05 : x. \quad x = \frac{100 \times 0.05}{m} = \frac{5}{m}$$

It follows, then, that we obtain the percentage of sugar in the juice anal by dividing 5 by the number of cubic centimetres necessary for the c reduction of the test copper liquor. If the juice was diluted, say with tw times its volume of water, we have to divide 20 $\times$ 5 by the number of cubic centimetres used. Assume that ten cubic centimetres of original juice were required, and that this was likewise mixed with twenty times its bulk of water, then we have:

$$\frac{5 \times 20}{10} = \frac{100}{10} = 10 \text{ per cent. of sugar.}$$

These brief hints are designed to apply to the determination of cane- alone, previously inverted into grape sugar. The simplicity of the pro the slight difficulty attendant upon the procuring of very correct results i ceu me to insert it for the benefit of manufacturers and others.

3. SUGAR FROM SORGHUM, OR CHINESE SUGAR-CANE.

This cane is now generally raised by farmers for home consumption, in the western States. From carefully conducted analyses by Dr. Wetherill and others, it appears that native sorghum stems contain from two to ten per cent. of cane-sugar, associated with more or less of gluc which may be the result of the action of an acid inverting a portion or all the cane-sugar. Contrary to my expectations, I found that the ex sorgho juice of ripe cane,* whether neutralized by lime or not, refused to crystallize, for what solidified or granulated after long standing of the sirup grape-sugar. This fact has been established by the largest and most sk farmers and experimenters, and admitted at the western sorghum conventi The result might be ascribed to the total inversion previously of the c by the influence of acid, or of a ferment, but this is not the case, as I have repeatedly been able to prove. The following extreme case may suffice for illustration of this fact: In the sugar determination which is here given, cane-sugar was found, and yet the most persistent efforts failed to produce a single crystal in the concentrated liquid.

Determination of cane-sugar and glucose in the sorghum juice.—The somewhat dry, submitted to a pressure of about 10 tons, yielded in 100 p 39.9 residue and 60 parts juice. Specific gravity of latter 1.0719.

(1.) *Determination of glucose.*—The filtered juice was diluted 20 times with distilled water, and the burette filled.

10 cubic centimetres of copper tartrate were heated in a porcelain dish to 63° C. = to 145° Fahrenheit,† and there was required for reduction—

1st trial, 27 cubic centimetres.
2d trial, 27.2 cubic centimetres.
Mean = 27.1 cubic centimetres.

$5 \times 20 = 100 \div 27.1 = 3.69$ per cent.

* The juice from unripe cane readily crystallizes.

† This temperature must never be exceeded, that the action of cane sugar upon the copper liquor may be prevented

) cubic centimetres of juice weighs (having a specific gravity of 1.0719) grammes; 107.2 grammes juice hence contain $\frac{3.69 \times 100}{107.2} = 3.45$ per of sugar. Then, since the cane yielded 40 per cent. residue and 60 per juice, the cane contained $\frac{3.45 \times 100}{60} = 2.07$ per cent. of glucose.

) *Determination of cane-sugar.*—Fifty cubic centimetres of juice were l with some 50 drops of sulphuric acid, and boiled for about one hour ıvert the cane sugar into glucose. The liquid was carefully neutralized carbonate of soda, and then, after being diluted 20 times, brought in conrith the boiling copper solution:

1st experiment, 4 8 cubic centimetres was required.
2d experiment, 4.6 cubic centimetres was required.
Mean = 4.7 cubic centimetres.

$$\frac{5 \times 20}{4.7} = \frac{100}{4.7} = 21.28 \text{ per cent. of glucose.}$$

ıe specific gravity of the sugary juice being 1.0719, 100 cubic centi-;s sugar liquor weigh 107.2 grammes; hence one hundred cubic centimeof juice contain $\frac{21.28 \times 100}{107.2} = 19.85$ per cent. of glucose. Again, since :ane furnished 40 per cent. residue, and 60 per cent. juice, the cane must nally contain $\frac{19.85 \times 60}{100} = 11.91$ per cent. of glucose; deducting the .tity of glucose first obtained, 2.07, from 11.91, we have 9.84 per cent. of ›se, which, as 100 parts of glucose correspond to 95 parts cane-sugar, nts 10.31 per cent. of cane-sugar.

series of experiments was instituted soon after this determination, in the of removing the hindrance to crystallization. Although unable thus far port any method which can be deemed practical, it was demonstrated that basic acetate of lead, and several other metallic salts, will remove the um member between sugar and gum which causes this hindrance.

ASSAY OF SILVER ORE FROM THE "ISAAC NEWTON LODE," UTAH TERRITORY.

ıis silver-bearing quartz was plentifully flecked with malachite, (carbonate of er,) and yielded, upon assay, to the ton of 2,240 lbs........... $70 78
ıother specimen, evidently inferior to the first, gave............ 56 64

ALYSIS OF SAND ROCK, IMPREGNATED WITH THICK AND HEAVY PETROLEUM, SAID TO COME FROM MECCA, OHIO.

ıe hundred parts by weight yielded—

tile oily matter	7.15
·tz	92.85
	100.00

lculated from the specific gravity of the oil, = (.9,) compared with that of r, = (1,) it follows that one ton (2,000 lbs.) of the above sand contains t 20 gallons of lubricating oil. A practical distillation gave the following ts. One hundred parts by weight yielded—

	4.26
	1.00
tz	92.85
	1.89
	100.00

The oil obtained by distillation was also measured, and the amount cont in one ton of sand calculated. The result showed 11.28 gallons of oil. It will be perceived that by the process of distillation we sustain considerable loss, partly in the form of coke deposited in the retort, and partly by the dec sition of the heavy paraffine oils at a high temperature. Hence, it would appear advisable to procure the oil by an extractive process, such, for instance, as has recently been patented by H. P. Gengembre, of Pittsburg, Pennsylvania, using for that purpose the cheap light petroleum naphtha, which, after having dissolved out of the rock all the heavy oil, can be driven off, recondensed and used again. An analysis later made from a similar specimen from Leavenworth, Indi by this process, gave for this rock, by the ton, 39.4 gallons.

6. ANALYSIS OF CALIFORNIA WINE.

This is in some respects a superior specimen of the California wines, cont ing but a trace of free sugar, and having evidently passed through all the stages of fermentation. Flavor good, though somewhat earthy, a peculiarity which can be removed by the improvement of the soil. Bouquet marked, showing c plete fermentation. Color, reddish pale brown. It will be observed that amount of extractive matters exceeds that of the majority of continental wines; a good property, since in well-cellared wines all the substances found in the extract add to their excellences. It contained—

Alcohol, by volume	15.00	per
Alcohol, by weight	12.00	"
Acid, calculated as dry tartaric	0.05	"
Extract, at 212°, consisting of sugar, salts, coloring matter, non-volatile free acids, &c.	6.05	"
Free sugar	a trace.	

7. ANALYSIS OF A MAGNETIC IRON ORE, FROM WEST VIRGINIA.

Water, at 100° C. (212° Fah.)	1
Metallic iron	69.04
Gangue (oxygen and mineral impurities)	29.56
	100

8. DETERMINATION OF OXALIC ACID AND MALIC ACID IN THE PETIOLES OF THE GARDEN RHUBARB (RHÈUM RHAPÓNTICUM.)

Bin-oxalate of potassa	0.20	per cent
Acid malate of potassa	1.45	"

The root yields tannin, gallic acid, malate, gallate and oxalate of lime, st sulphate, and muriate of iron, and extractive and coloring matter containing o: iron, &c., &c.

[illegible]ETERMINATION OF THE PHOSPHOR[illegible] ACID AND ALKALIES IN THREE SOILS [illegible] LAND OWNED BY [illegible] SHEPHE[illegible] [illegible], D. C., AND SAID TO [illegible]

[illegible]	4.60	per cent
Phos[illegible]	.05	"
[illegible]	no trace.	

[illegible]	3.75	per
[illegible]	0.133	"
[illegible]	a trace.	

SOIL C.

Soluble in water	4.90	per cent.
Phosphoric acid	0.085	"
Potash	no trace.	

NOTE.—A preliminary examination having demonstrated the leading defects of these soils, the analyses were conducted with special reference to them alone.

10. ANALYSIS OF COPPER PYRITES FROM MARYLAND.

Metallic copper	4.60	per cent.
Sulphur, sulphuret of iron, and other impurities	95.40	"
	100.00	

11. ANALYSIS OF A SOIL FROM MARYLAND.

Water (at 212°)	14.021
Organic matter and water of combination	7.692
Peroxide of iron and alumina	8.556
Lime	4.754
Magnesia	2 521
Potash	0.243
Soda	0.160
Sulphuric acid	0.190
Phosphoric acid	0.005
Soluble silicates	2.920
Insoluble silica	57.913
Loss	1.025
	100.000

12. ANALYSIS OF A SOIL FROM THE VICINITY OF UTICA, NEW YORK.

Organic matter and moisture	8.170
Insoluble silicious matter	81.000
Soluble silica	0.497
Chlorine	0.002
Peroxide of iron and alumina	9.413
Lime	0.290
Magnesia	trace.
Sulphuric acid	0 043
Carbonic acid	0.100
Potash	0.070
Soda	trace.
Phosphoric acid	trace.
Loss	0.415
	100.000

13. ANALYSIS OF COPPER ORE FROM DAVIS'S FARM, WASHINGTON COUNTY, MARYLAND.

The ore sent came from the surface rock, and was a mixture of red oxide, blue and green carbonate, together with sulphuret of copper, all associated together, even in small pieces of the gangue rock, which was made up of quartz and epidote.

The amount of metallic copper therein found was 27.75 per cent.

14 ANALYSIS OF COPPER ORE FROM THE LAND OF THOS. A. BROWN, WA[illegible] COUNTY, MARYLAND.

One hundred parts of the ore contained—

Sulphur	21
Copper	78.21
Silica	0.46
	99.74

The ore occurred in quartz, had the color and lustre of graphite, and, as the analysis shows, is almost pure copper glance, or sulphuret of copper.

15. ANALYSIS OF COPPER ORE FROM THE LAND OF DAVID WINTERS, WASHINGTON COUNTY, MARYLAND.

Character of the ore same as the preceding. In one hundred parts it [illegible]tained—

Sulphur	20 44
Copper	79.01
Silica	0.55
	100.00

I may state that, in connexion with these and other analyses of copper ores, I made quite an extended personal examination of the "South mountain copper region of western Maryland," the results of which were embodied in a special report published soon after

16. ANALYSIS OF A SOIL FROM ARKANSAS, WELL ADAPTED FOR THE GROWTH OF COTTON.

Organic matter		4.740
Carbonic acid		traces
Silicic acid		1 299
Soluble in water.—	Alumina	0.230
	Lime	0.389
	Magnesia	0.090
	Soda	0.034
	Common salt	0.107
Soluble in acid.—	Sulphuric acid	0.144
	Soluble silica	0.409
	Peroxide of lime and alumina	3.092
	Lime	0.535
	Magnesia	0.576
	Manganese	0.002
	Potash	0.348
	[illegible]uric acid	0.070
In[illegible] matter.—	Phosphoric acid	0.092
	[illegible]a	78.845
	[illegible]roxide of iron and alumina	5.[illegible]
	Lime	1.[illegible]
	Magnesia	1.142
	Manganese	0.623
		99.771

17. ANALYSIS OF A SOIL FROM GEORGIA.

: matter	12.08
in water	0 49
: in hydrochloric acid	9 43
le silicious matter	78.00
	100.00

ıg the individual constituents the results in 100 parts, as follows:

: matter		12.08
le silica		78.00
s solution.—	Potash	0.035
	Soda	0.129
	Magnesia	0.29
	Chlorine	0.032
solution. —	Sulphuric acid	none.
	Peroxide of iron and alumina	8.53
	Lime	0.67
	Magnesia	trace.
	Phosphoric acid	0.033
	Soluble silica	0.20
		99.999

18. ANALYSIS OF AN "OIL ROCK" FROM LEAVENWORTH, INDIANA.

oil was extracted by means of naphtha, which was afterwards *distilled off.* eld was found to be 39.4 gallons for the ton of 2,240 lbs.

se selections from the work of the laboratory during the past year will an idea of its nature and extent. Much has been done which cannot be ed in the limited space of this report. Mention will yet be made of a re important of these undertakings.

rge number of postage stamps, cancelling inks, &c., were examined for the ffice Department, with a view of testing the merits of each. A full report results was made, showing that the experiments occupied much time and led careful attention.

e a number of disinfectants have been analyzed, but the form and length reports upon them render it inexpedient to insert them here.

he instance of gentlemen from Massachusetts, I was directed to examine port upon a large deposit of granular quartz, situated in West Virginia. l days were occupied in the collection of geological data upon the spot, hich the quartz sand was submitted to a series of careful analyses, which ompared with the analyses of the sand used by various large glass manies, and executed at the same time. The results were highly gratifying, g that the substance in question was of sufficient purity for the manufacthe finest French plate glass.

fference existing between the buyers and sellers of government whiskey rd to its strength was satisfactorily settled by a careful comparison of the it instruments used, and the recommendation of a reliable scale. I am to learn since that my labor was rewarded by the saving to the governf a very large sum of money.

n my last report, I have to mention that a large number of inquiries by ave received full and careful answers, which often involved considerable h and the expenditure of much time. The office which I hold being it is impossible to secure that freedom from interruption which is so

necessary in all chemical investigations; not unfrequently the whole day is entirely occupied by attention to the queries of visitors who desire information necessitating the suspension and often the recommencement of such processes as were then under way.

I may be allowed to indulge the hope that the day is not far distant when it will be possible to provide for a division of labor in this section of the department also. The amount of work is far more than can be properly performed by one chemist and a clerk, while the apparatus is much in need of additions and renewals. The importance of applied chemistry is each day increasing. With each new want of modern civilization is created a demand for information upon many subjects connected with its most speedy and economical supply.

The science is fast gaining recognition as the key of all success in the arts and manufactures. It is, therefore, of great importance that proper means be adopted by the government for both investigation and discovery, and the dissemination of useful chemical knowledge.

HENRI ERNI, M. D., *Chemist*

Hon. ISAAC NEWTON,
Commissioner of Agriculture.

REPORT OF THE STATISTICIAN.

SIR: In presenting a report of agricultural statistics of the calendar year 1865, it is proper to say that, having been placed in charge of the statistical division of this department since the expiration of that year, I have not enjoyed the advantage of a supervision of all the data employed in estimates of crops and stock, but have used all of such material that was deemed essential to a condensed summary for the year, and have prepared concise statements of kindred facts originating in other departments of the government, and used such other reliable, though unofficial, material as seemed best adapted to my purpose. I have excluded commercial and financial statistics as subjects not strictly within the province of the statistical division of the department, except in peculiar cases illustrating some important bearing of commercial or monetary interests upon agriculture.

The statement giving the total amount of wool production and consumption in the loyal States during the period (four years) of the war is official so far as relates to the foreign wool, and is believed to be a very close approximation to actual facts in the estimate of the domestic product.

A detailed statement of exports of agricultural products, and of the manufactures immediately derived from them, for the past few years, with a condensed view of such exports for a period of forty years, was believed to be worthy of all the requirements of time and patience necessary for the compilation.

THE CROPS OF 1865.

The principal crops in 1865 were, as a whole, more than usually abundant. Corn, the pride of American husbandry, the national crop of the United States, was a magnificent product. The estimate for 1864 was 530,451,403; in 1865, 704,427,853, an increase of nearly 33 per cent. Illinois heads the list of corn-growing States with 177,095,852 bushels; Indiana follows with [illegible]6,069,[illegible]; Ohio, 94,119,644; Iowa, 62,997,813; Kentucky, 57,512,833.

[illegible] smaller crop than that of 1864, and of inferior quality. The [illegible]2,827 bushels in the States reported, against 160,695,823 in 1864. [illegible] planted in greater breadth than usual, and a superior crop was [illegible] would have been still larger but for the drought in the east, and [illegible] localities.

[illegible] were in excess of the products of the previous year.

A.—*Showing the estimated amount in bushels, &c., of each principal crop*
e several States named, the yield per acre, the total acreage, the average
' in each State, and the value of each crop, for 1865.

Products.	Amount of crop of 1865.	Average yield per acre.	Number of acres in each crop.	Value per bushel or pound.	Total valuation.
MAINE.					
:orn ....bushels..	1,692,020	34	49,765	$1 21	$2,037,344
.... " ..	175,591	13	13,507	2 21½	388,934
.... " ..	135,042	14½	9,310⅗	1 33½	180,281
.... " ..	2,348,342	26	90,321	61	1,432,489
.... " ..	735,266	20	36,763¼	96	705,855
ıeat .... " ..	356,684	20½	17,399⅛	90	321,016
s .... " ..	5,391,864	138½	39,072	57	3,073,362
).........pounds..	7,280	750	9⅗	22	1,601
............tons	1,429,511	1	1,429,511	11 81	16,882,525
Total...............	....	....	1,685,699	....	25,023,407
EW HAMPSHIRE.					
corn ....bushels..	1,468,090	33	44,487½	1 21¼	1,782,729
.... " ..	291,098	15⅐	19,406½	2 60	756,855
.... " ..	146,872	16	9,179½	1 28½	190,731
.... " ..	1,346,380	29½	46,427	68	915,538
.... " ..	101,979	21¼	4,856⅓	1 11¼	113,551
heat .... " ..	74,956	16¼	4,684¾	1 01¾	76,268
's .... " ..	3,183,500	120⅓	26,529	68	2,164,780
o ....pounds..	57,600	800	72	22	12,672
............tons	793,327	1	793,327	14 70	11,663,907
Total...............	....	....	948,969	....	17,677,031
VERMONT.					
corn ....bushels..	1,796,356	43¾	40,826$\frac{3}{11}$	1 15¼	2,070,300
.... " ..	558,811	18⅐	31,045	2 18	1,218,208
.... " ..	151,748	16	9,484¼	1 28⅛	194,426
.... " ..	4,213,926	39	108,049$\frac{5}{13}$	53½	2,254,450
.... " ..	10,375	28¾	3,461	1 08¾	109,157
heat .... " ..	210,516	26	8,097	75	157,887
:s .... " ..	5,526,089	164	33,635	42	2,320,957
o ....pounds..	59,000	750	79	20	11,800
............tons	991,814	1⅕	826,512	11 50	11,405,861
Total...............	....	....	1,061,189	....	19,743,046
IASSACHUSETTS.					
corn ....bushels..	2,363,245	33⅓	70,897¼	1 10½	2,611,385
.... " ..	107,465	17⅝	6,097	2 21¼	237,766
.... " ..	413,957	14¾	28,065	1 29½	536,073
.... " ..	1,194,827	26	45,955	72	860,275
.... " ..	144,598	19½	7,415¼	1 21	174,963
heat........ " ..	96,176	18⅓	5,278¼	1 01¼	97,377
:s .... " ..	3,046,391	104¾	29,013¼	73½	2,239,096
:o ....pounds..	5,746,000	1,200	4,788⅓	22½	1,292,850
............tons	844,173	1⅓	633,130	21 00	17,727,633
Total...............	....	....	830,629	....	25,777,418

TABLE A.—*Showing the estimated amount in bushels, &c.*—Continued.

Products	Amount of crop of 1865.	Average yield per acre.	Number of acres in each crop.	Value per bushel or pound.	Total valuation.
RHODE ISLAND.					
Indian corn ....bushels..	497,918	31½	15,809	1 22½	$609,949
Wheat .... " ..	1,413	....	....	....	....
Rye .... " ..	31,707	18	1,768	1 22½	38 911
Oats.............. " ..	140,202	32½	4,314	67½	94
Barley .... " ..	31,821	26½	1,201	1 37½	43
Buckwheat .... " ..	3,097	....	....	....	....
Potatoes .... " ..	525,727	107½	4,913	82½	433,
Tobacco ....pounds..	1,479	1,000	1½	30	—
Hay ....tons	64,312	1⅛	57,166	22 50	1,447
Total..............	....	....	85,172	....	2,668,368
CONNECTICUT.					
Indian corn ....bushels..	2,265,818	31¼	73,091	1 22½	2,775,627
Wheat .... " ..	71,881	17½	4,107	2 37½	170,717
Rye .... " ..	776,030	14	55,431	1 31¼	1,018,
Oats .... " ..	2,363,317	35¾	65,648	66⅝	1,575
Barley .... " ..	19,200	23½	817	1 37	26
Buckwheat .... " ..	300,545	16¼	18,784	1 07½	323
Potatoes .... " ..	1,558,177	121¼	12,051½	76¼	1,188
Tobacco ....pounds..	8,167,681	1,350	6,050	30	2,450
Hay ....tons	596,191	1¼	476,953	23 50	14,010,400
Total..............	....	....	662,932	....	23,538,717
NEW YORK.					
Indian corn ....bushels..	25,344,325	24	1,056,013⅓	95	24,077
Wheat .... " ..	12,556,406	15⅛	837,094	2 08¼	26,1
Rye .... " ..	5,369,874	15⅛	353,991	1 02	5,410,
Oats .... " ..	48,675,090	34¾	1,533,574	51½	25,067 871
Barley .... " ..	4,329,406	22 1/15	192,245 3/11	1 02	4,415
Buckwheat........ " ..	5,535,553	18	307,531	95	5,258,
Potatoes .... " ..	30,249,200	107	282,703	62	18,754,
Tobacco ....pounds..	11,836,607	1,091	10,849⅓	14	1,657,
Ha[illegible] ton[illegible]	5,288,352	1⅜	3,777,394	12 33	65,205,380
[illegible]	....	....	8,351,395	....	176,032,725
[illegible]					
[illegible]	9,733,901	42⅕	229,147	85½	8,322,485
[illegible]	1,265,690	12⅞	102,071	2 32¾	2,945,793
[illegible]	1,246,458	13½	92,330	1 04	1,296,316
Oat[illegible]	6,309,211	32	197,163	51½	3,249,244
Barl[illegible]	27,167	22	1,235	1 12	30,427
[illegible]	783,069	15¾	49,719	1 32½	1,035,608
[illegible]	4,122,151	90½	45,549	87	3,586,270
[illegible]	170,768	1,000	170¾	20	34,153
[illegible]	461,958	1¾	263,976	13 89	6,416,596
[illegible]	....	....	981,361	....	26,916,892

A—*Showing the estimated amount in bushels, &c.*—Continued.

Products.		Amount of crop of 1865.	Average yield per acre.	Number of acres in each crop	Value per bushel or pound.	Total valuation.
PENNSYLVANIA.						
dian corn	bushels..	35,477,106	40	886,928	80	28,838,168
heat	" ..	11,688,511	12⅕	958,075	2 05½	23,992,704
re	" ..	6,569,690	13½	486,644	1 37½	9,034,271
ts	" ..	46,571,661	34	1,369,754	48	22,354,397
rley	" ..	603,470	22⅓	67,423	96⅔	583,354
ckwheat	" ..	7,199,058	16½	436,307	1 03	7,415,030
tatoes	" ..	12,028,353	75¼	159,842	98⅙	11,787,786
bacco	pounds..	5,512,096	977	5,641	09 3/11	511,121
y	tons	2,463,545	1⅗	1,542,216	11 23	27,665,610
Total		....	....	5,912,830	....	132,682,441
MARYLAND.						
dian corn	bushels..	14,308,739	31 1/10	475,373⅓	76 1/10	10,888,950
heat	" ..	5,479,635	9 5/11	579,576	2 06½	11,315,446
e	" ..	476,770	10¼	45,692	85⅞	409,035
ts	" ..	6,135,779	24⅓	255,657	43⅛	2,644,520
rley	" ..	26,591	27½	967	97½	25,926
ckwheat	" ..	164,048	22⅛	7,411	97	159,127
tatoes	" ..	1,274,393	65½	19,456	84	1,070,490
bacco	pounds..	29,963,672	690⅝	43,425⅔	11½	3,445,922
y	tons	181,341	1½	120,894	16 42½	2,978,525
Total		....	....	1,548,452	....	32,937,941
DELAWARE.						
lian corn	bushels..	3,892,337	16½	235,596	75	2,919,253
neat	" ..	527,477	7½	70,330	2 00	1,054,954
e	" ..	37,038	....	....	1 00	37,038
ts	" ..	1,884,437	12	157,036	47	885,685
rley	" ..	4,595	7	656 3/7	95	4,365
ckwheat	" ..	15,641	10½	1,490	1 00	15,641
atoes	" ..	360,294	112½	3,217	77½	277,426
acco	pounds..	7,029	500	14	12	8,435
y	tons	29,800	1¼	23,840	17 00	506,600
Total		....	....	492,179	....	5,709,397
KENTUCKY.						
ian corn	bushels..	57,512,833	34	1,691,554	43⅓	24,922,247
eat	" ..	2,788,184	7¼	384,577	1 70½	4,753,854
e	" ..	476,453	9	52,939	93⅓	444,689
s	" ..	4,824,421	24⅓	198,264	46	2,219,234
ley	" ..	161,778	21⅑	7,703	1 09	176,338
kwheat	" ..	13,478	19¾	682	1 50⅝	20,301
atoes	" ..	1,395,468	59	23,652	90⅔	1,265,224
acco	pounds..	54,108,646	736¼	73,517	12	6,493,037
r	tons	127,301	1⅖	90,929	12 10	1,540,342
Total		....	....	2,523,817	....	41,835,266

A—*Showing the estimated amount in bushels, &c.*—Continued.

Products.		Amount of crop of 1865.	Average yield per acre.	Number of acres in each crop.	Value per bushel or pound.	Total valuation.
OHIO.						
Indian corn	bushels	94,119,644	41½	2,267,943	44 3/7	41,816,012
Wheat	"	17,601,472	9½	1,852,786¼	1 59 5/7	28,112,[illegible]
Rye	"	687,350	12½	54,988	72⅙	500,[illegible]
Oats	"	18,963,608	31⅜	598,851	34⅙	6,579,[illegible]
Barley	"	1,559,203	22 7/10	68,687	89½	1,395,427
Buckwheat	"	1,332,645	16	83,290	91⅓	1,217,[illegible]
Potatoes	"	4,385,087	83	52,832	91⅚	4,0[illegible]
Tobacco	pounds	26,116,138	744	35,102	9⅒	2,3[illegible],568
Hay	tons	2,158,021	1⅔	1,294,942	8 00	17,264,168
Total				6,309,421		103,288,044
MICHIGAN.						
Indian corn	bushels	17,520,305	38½	455,073	60⅑	10,706,850
Wheat	"	16,378,488	15⅜	1,045,435	1 65	27,024,[illegible]
Rye	"	413,150	14½	31,941	83	342,[illegible]
Oats	"	7,275,331	37¾	192,724	40	2,910,139
Barley	"	391,562	22⅔	17,275	96½	377,[illegible]
Buckwheat	"	1,136,365	20	56,818	88	1,0[illegible]
Potatoes	"	5,475,324	145 3/7	37,760	37½	2,0[illegible]
Tobacco	pounds	273,320	1,300	2,103	15½	42,[illegible]
Hay	tons	1,231,272	1⅙	684,040	12 16⅔	14,980,[illegible]
Total				1,523,169		59,438,336
INDIANA.						
Indian corn	bushels	116,069,316	40⅔	2,873,003	38 7/10	44,918,823
Wheat	"	13,020,803	8½	1,531,859	1 35½	17,643,188
Rye	"	371,123	12⅕	30,420	80⅓	298,135
Oats	"	8,062,351	29⅗	272,376	35 9/10	2,894,384
Barley	"	350,504	22⅕	15,779	98½	345,246
Buckwheat	"	299,388	18	16,633	87⅔	262,426
Potatoes	"	3,527,314	84	41,992	78	2,751,305
Tobacco	pounds	8,547,889	639½	13,376	10⅙	869,035
Hay	tons	1,251,646	1⅔	750,988	9 40	11,765,472
[illegible]				5,546,426		81,748,014
[illegible]						
[illegible]		177,095,852	35½	5,023,996	29½	51,800,536
[illegible]		25,266,745	11	2,296,977	1 09	27,541,732
[illegible]		833,069	16⅓	51,004	49⅓	410,977
[illegible]		28,088,197	35	802,520	24	6,741,167
[illegible]		1,058,931	21	50,425	56¾	600,943
[illegible]		287,379	17½	16,422	89⅗	258,066
[illegible]		5,864,408	117	50,124	47½	2,770,933
[illegible]	[illegible]	18,867,722	777	24,283	10 7/16	1,969,316
[illegible]	[illegible]	2,600,070	1½	1,733,380	9 30	24,180,651
[illegible]				10,049,131		116,274,321

A.—*Showing the estimated amount in bushels, &c.*—Continued.

Products.	Amount of crop of 1865.	Average yield per acre.	Number of acres in each crop.	Value per bushel or pound.	Total valuation.
MISSOURI.					
orn ....bushels..	52,021,715	39	1,333,890	52	27,051,292
.... " ..	2,953,363	12¾	231,636	1 62⅜	4,824,336
.... " ..	218,529	16⅜	13,111	89¾	196,229
.... " ..	2,501,013	26⅝	90,534	45⅚	1,146,297
.... " ..	148,855	23¼	6,402	117 3/11	174,566
eat........ " ..	72,461	20⅓	3,535	89	64,490
.... " ..	1,139,057	122 6/7	9,347	62⅛	720,011
............pounds..	15,237,982	940	16,211	13⅝	2,038,080
............tons	519,479	1¾	296,702	12 33	6,301,276
otal..............	....	....	2,001,368	....	42,516,577
WISCONSIN.					
corn ....bushels..	13,449,405	41½	324,084	46	6,209,726
.... " ..	20,307,920	16⅘	1,208,805	1 09	22,135,632
.... " ..	945,400	17¼	54,806	63	595,602
.... " ..	18,466,758	40⅜	454,100	28	5,170,692
.... " ..	843,649	26½	31,836	70 7/10	596,455
eat........ " ..	85,466	20	4,273	69	58,972
s .... " ..	4,925,341	141⅛	34,931	36	1,773,123
............pounds..	162,891	1,300	125¼	12	19,547
............tons	1,066,182	1½	710,788	10 14	10,811,085
otal..............	....	....	2,823,748	....	47,370,834
IOWA.					
corn ....bushels..	62,997,813	42⅗	1,478,822	30	18,899,344
.... " ..	13,698,542	14⅗	938,229	1 00½	13,702,788
.... " ..	119,333	18⅛	6,629	59	70,406
.... " ..	12,007,380	38⅐	315,984	26⅕	3,145,934
.... " ..	561,068	25⅐	20,403	56⅓	317,003
eat........ " ..	298,646	18⅜	15,999	82	244,890
s .... " ..	3,360,641	120⅛	28,005⅛	43	1,445,176
............pounds..	419,811	883⅓	475⅛	19½	81,863
............tons	1,018,455	1¾	581,974	7 35½	7,590,737
otal..............	....	....	3,386,520	....	45,498,141
MINNESOTA.					
corn ....bushels..	5,577,795	38	146,784	51½	2,872,564
.... " ..	3,425,467	20⅗	171,273	80	2,740,374
.... " ..	178,171	22⅛	8,099	65	125,811
.... " ..	3,388,848	41⅓	81,659	39	1,321,651
.... " ..	178,310	29	6,149	55	98,071
eat........ " ..	35,414	23	1,540	80	28,331
s .... " ..	3,244,711	197	16,420	35	1,136,649
............pounds..	30,029	1,000	30	20	6,005
............tons	274,217	1 7/10	161,304	8 59	2,355,524
Total..............	....	....	593,258	....	10,684,980

Showing the estimated amount in bushels, &c.—Continued.

…cts.	Amount of crop of 1865.	Average yield per	Number of acres in each crop.	Value per bushel or pound.	Total valuation.
…AS.					
….bushels..	6,72? 236	41⅙	163,463	53	3,
…. " ..	191,519	15⅓	12,768	1 77	[illegible]
…. " ..	4,061	23	176½	1 09	4,4
…. " ..	155,290	34⅛	4,567½	66¼	102
…. " ..	6,661	28⅛	235	1 10⅞	7
…. " ..	24,288	25¼	962	1 52½	37
…. " ..	276,720	119	2,325	97	268
….pounds..	22,043	533	41¼	25	5
….tons ….	118,348	2	59,174	8 00	!
…………	…………	………	243,712	………	5,347
…ERRITORY.					
….bushels..	2,494,084	46½	53,636	59	4,471,
…. " ..	166,348	18	9,241⅗	1 49	247
…. " ..	2,080	18	116	1 00	2
…. " ..	335,926	38⅜	8,614	53$\frac{4}{11}$	179
…. " ..	6,297	26⅘	242	1 16⅞	7,
…. " ..	6 146	26⅜	230½	1 37½	8,
…. " ..	171,885	138⅜	1,246	64½	110,
….pounds..	1,270	500	2½	20½	
….tons ….	29,425	2	14,712½	5 64	165
…………	…………	………	88,041	………	5,193,59

A general summary showing the estimated number of bushels, &c.
p, the number of acres of each, the value of each, and the bushel
value of all, and the increase and decrease of the same, for
, 1864, and 1865, and the comparison between 1864 and 1865.

ESTIMATED AMOUNT OF CROPS.

	1863.	1864.	1865.	Increase in 1865.	Decrease in 1865.
…sh.	397,839,212	530,451,403	704,427,853	173,976,450	………
…o..	173,677,928	160,695,823	148,522,827	…………	12,172
…o..	19,989,335	19,872,975	19,543,905	…………	329
…o..	170,129,864	175,990,194	225,252,295	49,262,101	…………
…o..	12,158,195	10,716,328	11,391,286	674,958	…………
…o..	15,786,122	18,700,540	18,331,019	…………	369,521
…o..	98,965,198	96,532,029	101,032,095	4,500,066	…………
…o..	888,546,554	1,012,959,292	1,228,501,280	228,413,575	12,871,587
…ds.	163,353,082	197,460,229	185,316,953	…………	12,143,276
…ns.	18,346,730	18,116,691	23,538,740	5,422,049	…………

ESTIMATED ACREAGE OF CROPS.

)rn. acres.	15,312,441	17,438,752	18,990,180	1,551,428	....
......do..	13,098,936	13,158,089	12,304,894	....	853,195
......do..	1,439,607	1,410,983	1,396,123	....	14,860
......do..	6,686,174	6,461,750	6,894,091	432,341	....
......do..	557,299	540,317	542,175	1,858	....
ɜat .. do..	1,054,060	1,051,700	1,057,084	5,384	....
.... do..	1,129,804	902,295	964,614	62,319	....
.... do..	216,423	239,826	236,363	....	3,463
.... do..	15,641,504	15,034,564	16,323,852	1,289,288	....
...... do..	55,136,248	56,238,276	58,709,376	3,342,618	871,518

ESTIMATED VALUE OF CROPS.

orn........	$278,089,609	$527,718,183	$324,168,698	....	$203,549,485
....	197,992,837	294,315,119	217,330,195	....	76,984,924
....	20,589,015	31,975,013	21,313,283	....	10,631,730
....	105,990,905	139,381,247	93,745,314	....	45,635,933
....	13,496,373	16,941,023	10,330,294	....	6,610,729
eat	12,660,469	21,986,763	18,063,325	....	3,923,438
....	55,024,650	77,184,043	65,218,428	....	11,965,615
....	24,239,609	29,335,225	23,348,013	....	5,987,212
....	247,680,855	365,707,074	273,812,617	....	91,894,457
l value...	955,764,322	1,504,543,690	1,047,360,167	....	457,183,523

EXPLANATION OF THE FOREGOING TABLES.

e A shows the estimated quantity in bushels, pounds, or tons of the crop of rith the average estimated yield per acre, the price and the total value. ıantity is estimated from the returns of county correspondents, reported ıs of the previous crop, showing increase or decrease as the report gives r less than ten tenths. These county returns, equitably averaged, give the united, deliberate judgment of a corps of careful resident observers; t is not absolutely correct, as it is not pretended to be, it is the nearest ap-ate estimate ever yet attained for the guidance of interested producers ısumers who always do and ever will seek greedily current judgments ıing crop productions, however incomplete, partial, and unreliable.

:e B shows the estimated quantity, acreage, and value of the principal f 1863, 1864, and 1865.

immense value of the nine products enumerated, amounting to one-third ɜntire aggregate of the national debt, exhibits the magnitude of our na-agriculture. The extraordinary prices prevalent in 1864, arising from r demand and rise in gold, swell the aggregate to $1,504,543,690, about :r cent. more than in 1865, when the aggregate quantity produced was ac-greater. It is possible, perhaps probable, that the next exhibit will rices still further reduced.

ı addition to these products, the crops of cotton, hemp, sugar-cane, sor-tobacco, garden vegetables, fruits, and a multitude of small products, not ·ated, could be introduced into a grand aggregate, the sum would as-even the political economist.

The following statement of the average rate of gold during the war will in understanding these variable values:

Years.	Value of crops.	Rate of gold.	Gold increase per cent.	Increase value crops per cent.
1862	$706,887,495	131		
1863	955,764,322	147	12	35
1864	1,440,415,435	227	54	50
1865	1,047,360,167	140	38½ decrease.	30.4 decrease.

AVERAGE VALUE OF CROPS PER ACRE.

The following tables are deductions from data furnished by the corps of tistical observers who have reported to this department during the last fou years. A comparison of figures for the different States, furnished by independ ent parties who could have no collusion with each other, will show a similarity in circumstances that are similar, and marked differences where one would natu rally expect them from superior culture or proximity to markets, that fu indubitable evidences of approximate correctness. And yet they are not assumed to be entirely accurate, nor yet so accurate as they may be made in the fu

It will excite surprise in the superficial observer, but not in the thin mind, that "sterile New England" should show so large a value of produce per acre. This value results primarily from the markets created by man tures, which also furnish the means and the inducements to artificial fer tion, and an encouragement to a greater expenditure of labor. It should be remembered that an acre of corn in New England means more than one dred and sixty rods of soil slightly scratched; it means also manure and work. As to actual profit, in proportion to labor and money expended, it or it may not, equal a similar expenditure in the west.

These tables teach, not only the value of *home markets*, but show how exces sive charges for transportation are eating out the substance of the west, red home prices and farmers' profits, and consigning corn to the grate or furnace. It should teach the west to diversify its industry, and divert labor from wh growing to industries which make light products. It should teach the west to consume its own wheat and corn, as far as possible, and save to its soil the ele ments of its fertility that are now wasted in the rivers of the east and of Europe.

The cost of transportation is in part the cause of the following receding s of values, from east to west:

States.	Value of corn.	Value of wheat.
[illegible]	$48 80	$29 03
New Jerse	37 30	28 25
Marylan	24 19	21 73
Ohi	20 20	16
In[illegible]	17 96	16
Illino	14 47	14
[illegible]	19 59	12 [illegible]

is the difference due to yield, notwithstanding the fertilizers and the labor ,ed in the east, as is seen:

States.	Bushels corn per acre.	Bushels wheat per acre.
ıt	37.61	15.07
:rsey	36.25	15.6
nd	25.9	11.5
	32.91	12.19
ı	33.85	13.1
	32.56	12.83
	36.06	13.7

:se differences scarcely exist as to barley, for which the market is much me in different sections. It is, moreover, a minor crop.

E C.—*Showing the estimated average value of farm products per acre for the States named, from* 1862 *to* 1865, *inclusive.*

ticles.	MAINE.				NEW HAMPSHIRE.			
	1862.	1863.	1864.	1865.	1862.	1863.	1864.	1865.
corn.	$31 96	$36 27	$56 70	$41 14	$34 58	$35 10	$61 72	$40 10
	24 80	21 12	27 18	28 80	22 95	26 88	33 50	39 74
	17 64	15 60	24 54	19 36	16 38	20 64	29 58	20 56
	15 12	16 75	22 22	15 86	11 56	16 74	22 08	20 06
	22 04	24 84	26 10	19 20	20 54	24 84	30 42	23 63
heat	18 20	12 76	24 32	18 45	13 80	23 80	25 31	16 53
:s	53 55	50 85	95 81	78 95	39 24	51 52	98 40	81 94
o	....	....	....	165 00	....	200 00	246 25	176 00
	11 11	11 44	18 37	11 81	13 80	14 00	21 00	14 70

	VERMONT.				MASSACHUSETTS.			
	$30 45	$38 28	$76 05	$50 42	$31 45	$39 60	$64 26	$36 83
	21 60	18 96	36 05	39 50	27 37	27 16	38 56	38 99
	12 90	17 55	28 57	20 50	13 75	20 64	30 00	19 10
	14 44	19 20	28 71	20 87	17 50	20 80	27 35	18 72
	18 72	27 82	35 42	31 26	22 62	22 68	35 60	23 60
heat	12 69	14 64	19 99	19 50	15 12	16 53	20 31	18 83
:s	33 75	48 50	87 76	68 88	55 46	72 08	123 22	76 99
o	....	160 00	....	150 00	160 16	318 00	412 50	270 00
	8 80	8 59	17 95	13 80	14 95	23 44	29 00	28 00

	RHODE ISLAND.				CONNECTICUT.			
	$31 08	$40 95	$63 22	$38 58	$26 88	$39 60	$56 11	$38 28
	30 00	24 00	37 50	....	24 48	25 05	39 19	41 56
	18 06	20 40	34 00	22 05	12 04	17 36	28 65	18 37
	21 60	19 60	32 58	21 94	15 84	20 88	30 00	23 82
	28 50	27 14	41 00	36 43	21 25	26 50	42 54	32 20
heat	15 30	18 00	....	....	11 20	13 02	22 41	17 47
s	69 44	73 15	124 31	88 68	48 60	71 69	108 73	92 45
o	....	287 50	405 00	300 00	182 00	312 50	362 50	405 00
	19 00	25 00	31 50	25 31	12 60	18 75	32 40	29 37

Estimated average value of farm products per acre, &c.—Continued.

Articles.	PENNSYLVANIA.				MARYLAND.			
	1862.	1863.	1864.	1865.	1862.	1863.	1864.	1865.
Corn	$20 16	$31 02	$45 64	$32 00	$17 36	$20 93	$34 83	$23 66
Wheat	21 96	19 88	28 80	25 09	19 46	18 04	29 90	19 52
Rye	12 96	14 04	24 25	17 57	12 80	12 96	22 96	8 79
Oats	13 69	17 25	25 45	16 32	10 40	9 45	19 14	10 50
Barley	24 65	26 62	30 78	21 58	27 84	24 00	47 65	26 81
Buckwheat	14 40	12 45	21 87	17 00	18 27	18 69	30 97	21 53
Potatoes	57 00	60 14	98 19	73 87	62 37	50 41	66 00	55 02
Tobacco	156 24	324 80	197 67	89 59	102 63	65 00	102 50	79 41
Hay	16 00	19 00	31 91	17 97	21 00	27 50	36 00	24 64

	NEW YORK.				NEW JERSEY.			
Corn	$23 10	$33 00	$49 28	$22 80	$25 16	$34 00	$53 87	$36 19
Wheat	22 50	19 46	30 50	31 96	24 70	24 48	34 95	28 86
Rye	14 44	14 98	24 72	15 50	14 04	17 10	22 88	14 04
Oats	16 10	19 60	21 62	17 73	15 18	17 52	29 62	16 48
Barley	30 74	24 78	32 69	22 54	18 75	23 54	35 70	24 64
Buckwheat	11 88	11 68	20 58	17 10	16 33	14 40	24 48	20 83
Potatoes	47 50	42 00	76 12	66 34	55 00	46 50	93 60	78 73
Tobacco	120 00	233 40	212 93	152 74	....	216 00	....	200 00
Hay	14 00	16 25	25 48	17 26	15 00	28 50	41 98	24 38

	DELAWARE.				KENTUCKY.			
Corn	$10 40	$25 00	$31 51	$12 37	....	....	$27 55	$14 73
Wheat	16 80	28 80	30 36	15 00	....	....	20 14	12 36
Rye	10 80	10 00	24 54	....	....	....	18 16	8 40
Oats	8 75	14 00	19 20	5 64	....	....	19 22	11 19
Barley	42 50	24 00	50 63	6 65	....	....	37 14	23 01
Buckwheat	15 00	10 00	20 00	10 50	....	....	27 96	29 74
Potatoes	56 00	60 00	165 00	87 18	....	....	89 01	53 49
Tobacco	36 00	54 00	....	60 00	....	....	92 40	88 38
Hay	19 25	25 00	45 00	21 25	....	....	26 88	16 94

	OHIO.				MICHIGAN.			
[illegible]	$14 52	$17 76	$30 08	$18 43	$17 22	$20 72	$30 66	$23 14
Vhe	15 36	14 69	19 78	15 17	18 00	17 03	23 52	25 85
Ry	9 60	12 32	16 19	9 09	9 72	11 57	16 70	12 03
Oat	4 95	13 92	20 84	10 82	8 06	14 85	19 68	15 10
Bar	19 75	25 30	36 92	20 31	21 00	22 89	30 03	21 87
Buc	12 19	9 57	18 70	14 61	9 89	9 70	14 22	17 60
Pota	40 80	54 72	87 60	76 22	41 54	48 96	64 38	54 53
[illegible]	103 40	105 98	117 52	67 70	130 00	198 03	200 00	201 50
[illegible]	10 50	16 75	25 77	13 33	12 00	14 06	21 48	21 90

Estimated average value of farm products per acre, &c.—Continued.

	INDIANA.				ILLINOIS.			
....	$12 18	$16 32	$27 70	$15 63	$9 20	$13 64	$24 75	$10 32
....	14 08	15 12	24 50	11 51	10 64	12 60	22 21	11 99
....	10 60	14 88	18 34	9 80	8 60	11 84	15 22	8 05
....	4 05	13 92	19 18	10 62	4 80	13 44	19 01	8 40
....	25 49	28 57	37 44	21 86	21 60	20 90	30 14	11 91
heat......	12 50	13 76	23 00	15 78	9 89	7 81	18 70	15 71
s........	44 80	47 12	79 60	65 52	40 00	51 80	93 44	55 28
o........	133 08	92 28	119 84	65 01	154 14	84 92	146 42	81 09
....	12 18	18 12	26 72	15 67	13 60	17 25	23 00	13 95

ticles.	MISSOURI.				WISCONSIN.			
	1862.	1863.	1864.	1865.	1862.	1863.	1864.	1865.
....	$9 88	$15 08	$26 00	$20 28	$16 00	$17 01	$29 14	$19 09
....	13 09	16 32	24 85	20 73	13 26	12 88	14 09	18 31
....	7 65	10 88	17 44	14 95	8 82	11 10	13 37	10 87
....	7 56	14 25	18 05	12 08	14 28	14 04	16 50	11 38
....	21 06	22 54	33 97	27 26	23 43	21 12	19 74	18 73
heat......	12 00	10 08	16 81	18 24	11 44	7 60	14 64	13 80
es........	36 49	60 75	68 38	76 23	48 32	37 83	64 90	51 00
co........	120 00	86 25	76 27	125 72	144 00	134 29	147 00	156 00
....	12 00	17 50	25 89	21 78	11 80	13 50	14 86	15 21

	IOWA.				MINNESOTA.			
....	$30 02	$10 80	$24 78	$12 78	$17 10	$14 03	$31 02	$19 57
....	9 66	10 64	16 48	14 63	11 20	9 80	15 15	16 48
....	9 20	10 62	13 80	10 81	6 72	10 80	13 19	14 52
....	8 58	10 14	16 96	10 00	13 33	17 28	21 13	16 18
....	15 66	20 16	25 25	14 20	16 66	19 20	21 83	15 95
vheat.....	10 73	14 88	19 95	15 31	10 92	10 79	20 97	18 40
es........	46 08	37 31	84 51	51 74	43 75	45 32	75 60	68 95
co........	113 28	134 10	239 25	172 24	125 40	84 00	160 00	200 00
....	16 00	12 25	15 45	12 87	12 00	9 00	14 04	14 60

	KANSAS.				NEBRASKA TERRITORY.			
....	$12 80	$13 20	$34 25	$21 82	....	....	$28 21	$27 43
t........	15 54	14 08	30 15	26 90	....	....	21 00	26 82
....	14 84	12 40	21 25	25 07	....	....	20 64	18 00
....	10 23	11 40	27 98	22 60	....	....	19 13	20 63
y........	24 05	21 50	29 21	31 39	....	....	24 50	31 03
wheat.....	15 30	13 23	18 75	38 50	....	....	....	36 66
es........	52 92	47 94	115 24	115 43	....	....	107 47	89 43
co........	205 00	176 00	75 94	133 25	....	....	....	102 50
....	10 20	10 00	21 67	16 00	....	....	9 99	11 28

TABLE D.—*Showing the average cash value of farm products per acre for four years, from 1862 to 1865, inclusive.*

States.	Corn.	Wheat.	Rye.	Oats.	Barley.	Buckwheat.	Potatoes.	Tobacco.	Hay.
Maine	$11 52	$25 48	$19 28	$17 49	$23 04	$18 43	$69 79	$165 00	$13 18
New Hampshire	42 87	30 77	21 79	17 61	24 85	19 86	67 77	200 00	15 87
Vermont	48 80	29 03	19 88	20 80	28 30	16 70	59 72	155 00	12 28
Massachusetts	43 03	33 02	20 87	21 09	26 17	17 70	81 94	290 16	23 85
Rhode Island	43 46	30 87	23 63	23 93	33 27	18 00	88 89	293 62	25 20
Connecticut	40 22	32 57	19 10	22 63	30 62	16 02	80 37	315 50	23 98
New York	32 04	26 10	17 41	18 76	27 69	15 31	57 99	179 77	18 [illegible]
New Jersey	37 30	28 25	17 01	19 70	25 66	19 01	68 46	208 00	27 [illegible]
Pennsylvania	32 20	23 93	17 20	18 18	25 91	16 43	72 30	192 07	21 22
Maryland	24 19	21 73	14 38	12 37	31 57	22 36	58 45	87 38	27 28
Delaware	19 82	22 74	15 11	11 90	30 94	13 87	92 04	50 00	27 62
Kentucky*	21 14	16 25	13 28	15 20	30 07	28 85	71 25	90 39	21 91
Ohio	20 20	16 25	11 80	12 63	25 57	13 77	64 83	98 65	16 59
Michigan	22 93	21 10	12 50	14 42	23 95	12 85	52 35	182 38	17 36
Indiana	17 96	16 30	13 40	11 94	28 34	16 26	59 26	102 55	18 17
Illinois	14 47	14 36	10 93	11 41	21 14	13 03	60 13	116 64	16 95
Missouri	17 81	18 75	12 73	12 98	26 21	14 28	60 46	102 06	19 29
Wisconsin	20 31	14 63	11 04	14 05	20 75	11 87	50 51	145 32	13 84
Iowa	19 59	12 85	11 11	11 42	18 82	15 22	54 91	164 72	14 14
Minnesota	20 43	13 16	11 31	16 98	18 41	15 27	58 40	142 35	12 41
Kansas	20 52	21 67	18 39	18 05	26 54	21 44	82 88	147 55	14 47
Nebraska Territory*	27 82	23 91	19 32	19 88	27 76	36 66	98 45	102 50	10 63

*Average of 1864-'65. No returns for 1862-'63.

TABLE E.—*Showing the average yield of farm products per acre for four years, from 1862 to 1865, inclusive.*

States.	Corn.	Wheat.	Rye.	Oats.	Barley.	Buckwheat.	Potatoes.	Tobacco.	Hay.
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Lbs.*	*Lbs.*
Maine	31.5	12.86	14.37	27.25	22.56	22.37	136.87	750. ‡	1868.
New Hampshire	32.62	14.19	16.12	28.62	22.06	18.85	126.37	862. †	2075.
Vermont	37.64	15.07	15.3	35.	25.18	24.05	139.62	775. §	2150.
Massachusetts	33.7	16.15	15.18	28.32	21.87	18.71	115.31	1298.5	2408.
Rhode Island	33.44	17. †	18.25	34.62	26.12	17.5	113.5	1166.6†	2219.
Connecticut	31.8	16.5	14.25	31.94	24.25	15.7	116.8	1337.5	2375.
New York	30.33	15.08	15.7	30.1	22.7	18.5	107.8	1078.5	2577.
New Jersey	36.25	15.6	15.	30.47	22.25	17.9	88.05	1100. §	3044.
Pennsylvania	34.6	14.05	14.7	31.3	22.8	18.5	99.14	1070.4	2750.
Maryland	25.9	11.5	16.06	23.5	27.79	23.2	74.9	778.9	2891.
Delaware	20.46	13.13	14.55	20.25	19.75	17.62	106.1	366.66	2750.
Kentucky	31.25	8.75	11.2	24.29	22.22	20.08	70.05	353.25	2733.33
[illegible]	32.91	12.19	13.69	24.9	23.34	16.75	82.75	827.9	2733.33
[illegible]	32.96	14.66	14.44	29.19	22.7	16.25	113.6	1066.5	2831.
[illegible]	33.85	13.1	15.55	23.65	24.55	19.4	84.5	843.4	3078.
[illegible]	32.56	12.83	16.83	27.5	25.4	17.1	92.06	862.75	3100.
[illegible]	33.2	14.99	16.58	26.15	24.06	18.8	88.3	813.	2964.
[illegible]	34.9	14.3	15.62	34.29	23.69	18.1	126.9	1128.25	2809.
[illegible]	36.06	13.7	18.53	33.8	24.8	20.29	107.8	882.3	3550.
Min[illegible]	34.75	16.98	19.66	35.06	26.75	19.9	146.75	910.	3350.
[illegible]	37.54	16.8	22.	31.5	28.3	22.8	93.	778.25	3683.
[illegible]	37.5	16.	17.	16.66	23.27	‡26.66	95.16	587.5	3333.

[illegible] ‡ 1865. § Average of 1863-65.

THE FARM STOCK OF 1865.

e estimates of the number of each kind of farm stock are made for each y by our corps of statistical correspondents according to their best judg- after careful examination and mature reflection, first, in comparison with ublished census returns, and then, year by year, with the estimates of receding year, the expression being in a certain number of tenths of such ding crop. These estimates were made in January, 1866, and show ,019 horses, against 3,740,933 in January, 1865. Mules, 250,151; for 247,553. Cows, 5,779,644; for 1864, 5,768,130. Other cattle, 6,895,324; 64, 7,072,591. Sheep, 32,695,797; for 1864, 28,647,269. Hogs, 13,616,876; 364, 13,070,887.

.E F.—*Showing the estimated total number and total value of each kind live stock, and the general average price thereof, for each State, for Feb- ary,* 1866.

States.	Horses.			Mules.		
	Number.	Average price.	Total value.	Number.	Average price.	Total value.
....	50,844	$83 82	$4,262,955	140	$75 00	$10,500
Hampshire.	34,749	74 38	2,335,139	9	42 22	380
ont........	47,781	72 31	3,651,752	42	70 00	3,325
chusetts...	48,509	79 00	3,839,970	119	....	....
Island....	6,828	89 00	607,916	....	....	....
ecticut.....	38,009	82 56	3,138,108	105	145 00	15,225
York........	408,763	92 41	37,774,098	2,078	100 43	218,795
ersey.......	79,599	116 77	9,295,228	7,497	122 00	914,715
ylvania....	396,623	95 31	37,803,438	13,915	108 43	1,506,848
and.......	83,334	85 90	7,358,599	10,558	102 65	1,083,852
are.......	15,523	80 10	1,244,500	2,280	92 28	210,400
cky.......	209,136	76 97	16,099,176	59,752	101 98	6,073,718
....	520,498	74 37	38,710,308	7,539	89 33	675,251
gan.......	171,956	88 22	15,169,612	699	106 69	74,574
na..........	377,215	73 80	27,839,973	21,878	91 00	1,991,071
s..........	574,205	79 61	45,715,740	50,899	98 00	5,033,951
uri........	235,375	74 11	17,453,777	52,127	95 76	4,982,345
nsin......	174,608	100 38	17,527,344	1,956	113 00	221,211
....	342,136	85 82	29,365,545	14,036	110 65	1,553,107
sota......	39,500	105 33	4,160,565	789	117 00	93,342
s..........	32,469	77 28	2,509,383	2,490	92 31	229,854
ska Ter....	11,359	97 00	1,022,687	1,243	128 56	147,375
al.........	3,899,019	....	326,885,813	250,151	....	25,039,839
rage price..	....	83 84	....	....	100 09	....

Table F—Continued.

States.	Cows.			Other cattle.		
	Number.	Average price.	Total value.	Number.	Average price.	Total value.
Maine	129,891	$56 28	$7,310,265	155,541	$41 70	$6,486,625
New Hampshire	74,378	43 22	3,214,617	114,770	38 15	4,378,492
Vermont	162,356	54 28	8,812,684	143,404	43 00	6,169,644
Massachusetts	127,415	62 00	7,899,730	116,758	37 94	4,430,330
Rhode Island	20,581	65 66	1,351,485	20,417	46 53	950,160
Connecticut	112,482	53 75	6,045,907	139,754	41 67	5,824,299
New York	1,237,631	55 14	68,242,973	726,412	38 53	28,995,667
New Jersey	131,170	70 00	9,181,900	89,790	48 58	4,362,510
Pennsylvania	655,397	51 18	33,962,485	693,351	34 72	24,079,491
Maryland	94,845	41 20	3,907,614	115,623	25 43	2,900,022
Delaware	19,215	75 00	1,441,125	30,143	39 72	1,198,555
Kentucky	155,112	50 00	7,755,600	391,764	35 38	13,789,986
Ohio	664,065	47 33	31,432,410	711,531	31 76	22,598,264
Michigan	219,784	43 52	9,564,100	296,111	31 56	9,347,791
Indiana	422,883	50 33	21,285,111	502,844	25 00	12,691,659
Illinois	523,761	34 84	18,247,833	922,874	21 64	19,964,055
Missouri	251,088	32 87	8,253,261	447,456	22 61	10,119,166
Wisconsin	284,286	35 33	10,044,872	375,802	28 12	10,588,108
Iowa	313,739	30 12	9,451,387	570,693	23 15	13,215,097
Minnesota	86,644	34 92	3,025,608	135,653	27 60	3,744,542
Kansas	71,996	27 94	2,013,568	130,307	25 00	3,256,499
Nebraska Ter	20,925	34 86	637,166	64,326	26 22	1,687,174
Total	5,779,644		273,081,701	6,895,324		210,778,136
Average price		47 25			35 57	

States.	Sheep.			Hogs.		
	Number.	Average price.	Total value.	Number.	Average price.	Total value.
Maine	1,041,724	$4 67	$4,870,060	35,355	$24 64	$771,406
New Hampshire	677,571	4 84	3,273,796	31,333	21 00	660,198
Vermont	1,377,296	5 92	8,163,922	32,908	20 43	672,405
Massachusetts	210,036	5 30	1,063,306	45,549	22 61	1,029,858
Rhode Island	35,884	6 00	216,021	11,690	21 41	250,335
Connecticut	188,308	5 97	1,123,727	52,356	20 12	1,053,664
New York	5,117,148	5 00	25,688,083	671,984	14 33	9,632,890
New Jersey	181,096	6 55	1,186,179	192,630	15 64	3,014,653
Pennsylvania	3,230,440	4 90	15,837,222	892,032	11 94	10,658,259
Maryland	262,576	5 83	1,531,693	368,396	9 17	3,380,033
Delaware	17,500	4 25	74,374	32,098	9 37	300,915
Kentucky	864,068	3 97	3,394,920	1,794,556	7 37	13,234,850
Ohio	6,568,052	4 58	30,103,572	1,838,481	9 62	17,695,377
Michigan	3,473,075	4 26	14,795,200	351,017	8 66	3,139,845
[illegible]	2,783,367	3 30	9,393,864	2,261,780	6 83	15,455,393
[illegible]	2,446,081	3 77	9,240,417	1,976,208	8 73	17,257,236
[illegible]	830,999	2 87	2,391,200	988,857	5 88	5,816,950
[illegible]	1,260,900	4 71	5,945,143	357,668	9 25	3,308,429
[illegible]	1,950,752	3 78	7,378,719	1,423,568	7 71	10,982,827
[illegible]	90,496	4 22	382,119	127,701	9 91	1,265,031
[illegible]	82,662	3 80	314,253	95,429	8 42	803,749
[illegible]	15,766	3 67	57,907	35,280	8 20	288,855
[illegible]	[illegible]		[illegible]	13,616,876		120,673,158
[illegible]		[illegible]			8 86	

G.—*Showing the total value of live stock in the following States for the years* 1860, 1865, *and* 1866.

	1860.	January, 1865.	February, 1866.
	$15,437,533	$21,539,128	$23,711,811
mpshire	10,924,627	13,560,612	13,862,622
t	16,241,989	24,905,952	27,473,732
usetts	12,737,744	17,638,783	18,263,194
sland	2,042,044	2,675,029	3,375,917
icut	11,311,079	13,844,574	17,200,930
rk	103,856,296	148,536,690	170,552,506
sey	16,134,693	22,415,429	27,955,185
vania	69,672,726	105,862,161	123,847,743
d	14,667,853	19,139,655	20,161,813
re	3,144,706	3,545,607	4,469,869
ky	61,868,237	56,729,634	60,348,250
	80,384,819	126,979,891	141,215,182
n	23,714,771	47,311,803	52,091,122
	41,855,539	82,543,704	88,657,071
	72,501,225	116,588,288	115,459,232
i	53,693,673	44,431,766	49,016,699
sin	17,807,375	36,911,165	47,635,107
	22,476,293	66,572,496	71,946,682
ota	3,642,841	8,860,015	12,671,207
	3,332,450	7,324,659	9,127,306
a Territory	1,128,771	3,216,312	3,841,164
Total	658,577,284	991,133,353	1,102,884,344

FARM STOCK OF THE UNITED STATES AND EUROPE.

mparison of the farm stock of this country and European nations illus- well the extent and munificence of our agricultural resources. A vast great fertility has enabled us, in the very brief period of our national , to secure an ampler supply of meat than any other civilized nation in tion to population.

re has been a loss, to be sure, since 1860, by the waste of the war, in hing except sheep. It is a loss, however, that stock-growing enterprise, ted by high prices, will soon repair. The increase of sheep to double umbers in 1860 is an earnest of what can be accomplished by such an ent. If the States reported in the following tables may be assumed fairly esent this decrease for the whole country, including the southern States eir heavy losses on the one hand, and the steady increase of stock in the States on the other, the per centage of decrease since 1860 may be esti- as follows: horses, ten per cent.; mules, twenty per cent.; cattle, seven nt.; swine, twenty-two per cent.

following is the statement for 1860 for the whole country:

	6,249,174
	1,151,148
	25,616,019
	22,471,275
	33,512,867

But there is another return of the assistant marshals in charge of the which includes stock not on the schedules of farmers, representing su n market, in transitu, or in the hands of individuals not stock-growers. A , and the exhibit is as follows :

Horses	7, 434, 688
Mules	1, 317, 934
Cattle	28, 963, 028
Sheep	23, 977, 085
Swine	36, 980, 772

TABLE H.—*An exhibit of the estimated numbers of the several kinds of farm stock of U. States in January.* 1866, *as compared with the census exhibit of* 1860.

States.	Horses.		Mules.		Cattle.	
	1860.	1866.	1860.	1866.	1860.	1866.
Maine	60, 637	50, 844	104	140	376, 933	285, 432
New Hampshire	41, 101	34, 749	10	9	264, 467	189, 148
Vermont	69, 071	47, 781	43	42	370, 450	305, 760
Massachusetts	47, 786	48, 509	108	119	279, 914	244, 173
Rhode Island	7, 121	6, 828	10	....	39, 105	[illegible]
Connecticut	33, 276	38, 009	82	105	241, 907	[illegible]
New York	503, 725	408, 763	1, 553	2, 078	1, 973, 174	1, 964, [illegible]
New Jersey	79, 707	79, 599	6, 362	7, 497	238, 794	220, 960
Pennsylvania	437, 654	396, 623	8, 832	13, 915	1, 419, 493	1, 348, 748
Maryland	93, 406	83, 334	9, 829	10, 558	253, 241	210, 468
Delaware	16, 562	15, 523	2, 294	2, 280	57, 721	49, 358
Kentucky	355, 704	209, 136	117, 634	59, 752	836, 059	546, 876
Ohio	625, 346	520, 498	7, 194	7, 539	1, 634, 740	1, 375, 596
Michigan	136, 917	171, 956	330	699	479, 844	515, 895
Indiana	520, 677	377, 215	28, 893	21, 878	1, 069, 384	925, 727
Illinois	563, 736	574, 205	38, 539	50, 899	1, 583, 813	1, 446, 635
Missouri	361, 874	235, 375	80, 941	52, 127	1, 168, 984	698, 544
Wisconsin	116, 180	174, 608	1, 030	1, 956	521, 860	660, 088
Iowa	175, 088	342, 136	5, 734	14, 036	540, 088	884, 432
Minnesota	17, 065	39, 500	377	789	119, 257	222, 297
Kansas	20, 344	32, 469	1, 495	2, 490	93, 455	202, 303
Nebraska Territory	4, 449	11, 359	469	1, 243	37, 197	85, 251
Total	4, 287, 426	3, 899, 019	311, 864	250, 151	13, 599, 880	12, 674, 968

TABLE H—Continuod.

States.	SHEEP.		SWINE.	
	1860.	1866.	1860.	1866.
.....	452,472	1,041,724	54,783	35,355
ampshire	310,534	677,571	51,935	31,333
nt	752,201	1,377,296	52,912	32,908
husetts	114,829	210,036	73,948	45,549
Island	32,624	35,884	17,478	11,690
ticut	117,107	188,308	75,120	52,356
ork	2,617,855	5,117,148	910,178	671,984
rsey	135,228	181,096	236,089	192,630
lvania	1,631,540	3,230,440	1,031,266	892,032
nd	155,765	262,576	387,756	368,396
re	18,857	17,500	47,848	32,098
ky	938,990	864,068	2,330,595	1,794,556
.....	3,546,767	6,568,052	2,251,653	1,838,481
an	1,271,743	3,473,075	372,386	351,017
a	991,175	2,783,367	3,099,110	2,261,780
.....	769,135	2,446,081	2,502,308	1,976,208
ri	937,445	830,999	2,354,425	988,857
nsin	332,954	1,260,900	334,055	357,668
.....	259,041	1,950,752	934,820	1,423,568
sota	13,044	90,496	101,371	127,701
.....	17,569	82,662	138,224	95,429
ska Territory	2,355	15,766	25,369	35,280
Total	15,419,230	32,695,797	17,383,629	13,616,876

BLE I.—The following is a table showing the results of the official census tly (and for the first time) taken in Great Britain. As in our own census, gures are more likely to be too small than too large, on account of the ıg suspicion (which also affects the accuracy of our own census to some t) that taxation is at the bottom of all inquisition into the farmers' affairs. English papers stoutly affirm the existence of such a feeling in the present

isions of United Kingdom.	Date of return.	CATTLE.		
		Cows.	Other cattle.	Total.
nd	March 5, 1866	1,290,529	2,016,505	3,307,034
.....	do	222,546	318,855	541,401
nd	do	370,457	566,954	937,411
d	Year 1865	1,386,176	2,107,238	3,493,414
Man	March 5, 1866	7,755	10,932	18,687
nnel Islands:				
.....	do	5,815	6,222	12,037
sey, &c	do	3,030	3,946	6,976
Total for United Kingdom		3,286,308	5,030,652	8,316,960

TABLE K.—*Showing the number of cattle, sheep, and swine, at the dates tioned, in the several nationalities of Europe.*

Countries.	Date of returns of live stock.	Population according to latest returns.	CATTLE.		
			Cows.	Other cattle.	Total.
United Kingdom	1865–'66	29,070,932	3,286,308	5,030,652	8,316
Russia	1859–'63	74,139,394			25,444,[illegible]
Denmark, Schleswig, and Holstein.	1861	2,646,051	1,172,895	626,252	1,799,147
Sweden	1860	3,859,728	1,112,944	803,714	1,916,658
Prussia	1862	18,491,220	3,382,703	2,251,797	5,634,500
Hanover, Saxony, Wurtemburg, and Grand Duchies.	1852 to 1863.	9,395,738	1,728,224	1,273,029	4,170,275
Holland	1864	3,618,459	943,214	390,673	1,333,887
Belgium	1856	4,529,461			1,257,649
France	1862	37,386,313	5,781,465	8,415,895	14,197,360
Spain	1865	15,658,531			2,904,598
Austria	1863	36,267,648	6,353,086	7,904,030	14,257,116
Bavaria	1863	4,807,440	1,530,626	1,655,356	3,185,882

Countries.	Date of returns.	Sheep.	Swine.
United Kingdom	1865–'66	25,795,708	3,802,399
Russia	1859–'63	45,130,800	10,097,000
Denmark, Schleswig, and Holstein	1861	2,279,513	471,193
Sweden	1860	1,644,156	457,981
Prussia	1862	17,428,017	2,709,709
Hanover, Saxony, Wurtemburg, and Grand Duchies	1861 to 1864	5,323,223	1,855,114
Holland	1864	930,136	294,636
Belgium	1856	583,485	458,418
France	1862	33,281,592	5,246,403
Spain	1865	22,054,967	4,264,817
Austria	1863	16,964,236	8,151,608
Bavaria	1863	2,058,638	926,522

In an analysis of these tables it appears that the United States led all other [illegible]tions in 1860 in numbers of cattle and swine, as doubtless, at the present [illegible]me, it leads in sheep likewise. As compared with population, we had 1.5 [illegible]ple to each sheep, 1.1 to each head of cattle, and less than one to each head [illegible]ne. We have now less [illegible] than sheep.

[illegible]e, according t[illegible] [illegible]les, the comparison with population is as [illegible]nmark 1.4 [illegible] [illegible] of cattle; B[illegible]aria, 1.5; Sweden, 2; [illegible] Holland 2[illegible] Russia, 2.9; Prussia, [illegible]

[illegible] sheep; Prussia, 1; [illegible]; Russi[illegible]; Hanover, 1.7; [illegible] Hollan[illegible]8; Belgium, 7.9.

[illegible] Europe in the supply of [illegible] than any other European [illegible] to population. Spain had

3.6 people to each head of swine; Austria, 4.4; Hanover, 5; Bavaria, 5.1; Denmark, 5.6; Prussia, 6.8; France, 7.1; Russia, 7.3; Great Britain, 7.6; Sweden, 8.3; Belgium, 9.8; Holland, 12.2.

SHEEP KILLED BY DOGS

The slaughter still goes on, and the useless cur is not even taxed. While all cattle, swine, sheep, and all other animals are sought out by the United States revenue assessors, the dog (which is taxed an equivalent of three dollars in Great Britain, where it is the source of much revenue) is still on the free list. If the dog is property, he may be taxed; if not, any one may kill him without hindrance.

Efforts have been made to get at least partial returns of losses of sheep by these canine nuisances throughout the country. In the monthly circulars of the department inquiries have been placed, and returns from many counties have been received, exclusive of the southern States and of the Pacific States and Territories.

A few of the heavier losses of sheep by dogs (the killed only) in several States are given as follows: Maine: York county, 312 killed. Vermont: Rutland county, 450 killed. Massachusetts: Franklin county, 300 killed. Rhode Island: Hartford county, 294 killed. New York: Steuben county, 605 killed; Tioga county, 450 killed; Genesee county, 500 killed; Chatauque county, 575 killed; Otsego county, 400 killed. Pennsylvania: Philadelphia county, 1,500 killed; Butler county, 350 killed; Erie county, 300 killed. Ohio: Clark county, 627 killed; Champaign county, 540 killed; Fairfield county, 651 killed; Brown county, 619 killed; Coshocton county, 584 killed. West Virginia: Monongalia county, 500 killed; Putnam county, 300 killed. Maryland: Cecil county, 309 killed. Michigan: Ionia county, 1,000 killed; Wayne county, 450 killed. Indiana: Ripley county, 700 killed; Putnam county, 500 killed; Marion county, 500 killed; Daviess county, 500 killed. Kentucky: Boone county, 3,000 killed; Breckinridge county, 586 killed; Warren county 500 killed. Illinois: Brown county, 600 killed; Cass county, 2,000 killed; Scott county, 750 killed; Macon county, 1,500 killed. Iowa: Lucas county, 1,200 killed; Mahaska county, 865 killed; Davis county, 600 killed; Page county 1,094 killed. Wisconsin: Milwaukie county, 654 killed; Fond du Lac county, 381 killed. Missouri: Cooper county, 400 killed; Miller county, 550 killed; Marion county, 1,520 killed; Cedar county, 500 killed; Hickory county, 1,000 killed; Clark county, 500 killed; Lewis county, 500 killed. In thirty counties in Missouri 7,911 are reported killed. Kansas: Doniphan county, 1,300 killed.

TABLE L.—*Exhibiting the number of counties reported, number of sheep therein, and average number killed for the counties reported, in the States mentioned.*

	Number of counties reported.	Number of sheep killed by dogs.	Average number killed per county.
Maine	9	1,262	140
New Hampshire	4	88	22
Vermont	5	700	
Massachusetts	8	588	[illegible]
Rhode Island	1	77	77
Connecticut	2	494	247
New York	27	5,694	211
New Jersey	7	423	60
Pennsylvania	27	4,615	171
Maryland	7	819	117
Delaware	1	200	200
Kentucky	20	8,206	410
Ohio	37	10,664	288
Michigan	20	3,338	167
Indiana	35	7,135	[illegible]
Illinois	41	11,051	
Missouri	30	7,911	[illegible]
Wisconsin	21	3,055	[illegible]
Iowa	33	7,744	234½
Minnesota	13	266	20½
Kansas	10	1,879	188
Nebraska Territory	2	35	17½
West Virginia	13	1,610	124
Total	373	77,854	208

These returns are not given as estimates of the total number of sheep killed in the counties mentioned. The inquiry was an exceptional one, and the answers given, as expressly stated, included only a partial exhibit, as far as the immediate knowledge of the correspondent extended. The actual fact, on full return, would possibly double the figures in many counties. It is worthy of no-[illegible]ice that far greater losses are reported in Kentucky and Missouri than in Ohio, [illegible]nning up to 1,000, 2,000 and even 3,000 in a county. The counties returned [illegible] less than one-fourth of the whole number of counties in those States. The [illegible]owing, so far as it proves anything, establishes the fact that some of the other [illegible] lose far [illegible] in [illegible]ion to their number of sheep than the State of [illegible] that [illegible] estima[illegible] [illegible]tofore made upon that basis are rather below [illegible] [illegible] partial enumeration of 77,854 sheep killed, [illegible] ne total number of counties in the several States [illegible]y similar estimates for the southern and Pacific States, [illegible] nillion of sheep killed by dogs in the country. Then [illegible]n sheep, and sum up the total loss, at present prices, [illegible] [illegible]mous. The average estimated value last win-[illegible] [illegible]tates. Estimated at $4 for the whole country, [illegible] [illegible]nis year [illegible]ill prove a tax of two millions of dol-[illegible] [illegible] the injuries would increase the sum [illegible] [illegible] [illegible]ggregate of three millions. But this is

worst view of the case; a far greater loss results to the productive wealth nation by the refusal of farmers to engage in wool-growing, repelled by iscouraging losses.

PRODUCTION AND CONSUMPTION OF WOOL.

erroneous impression exists in many minds relative to the amount of wool ictured in this country. Because almost fabulous increases have been l in army enlistments, the contraction of national indebtedness, and in pular estimate of national power, it is thoughtlessly assumed that the r of pounds of wool worn annually per capita is augmented in like pro- i. There has been much annual waste by a million of men in arms, but onstituted but three per cent. of the population; and with a plethora of cy, and high prices of labor, the people at large were able to wear more ns. This has increased the per capita consumption from 4½ or 5 pounds ounds per annum, at a fair estimate.

iould be remembered that in 1830 the value of woollen manufactures was 4,528,166; in 1840 it was $20,696,999; in 1850, $43,207,545; in 1860, i5,965, in which 80,386,572 pounds of wool were consumed. This was ghest figure ever attained before the war. Now, examine the facts of later nption of wool in manufacture, and the results will show a progress suffi- r encouraging, without indulging in vague and wild estimates which are yond the truth.

following tables are the official figures representing the wool imports from l, 1861, to June 30, 1865, inclusive—four years. They show an aggre- f wool and shoddy, (27,155,133 pounds of the latter,) amounting to i3,049 pounds. This, with the wool produced in those four years, con- s nearly the amount manufactured. To be exact, something should be ed from the aggregate of wool, on account of the greater amount on hand l, 1865. The available wool product of the United States is, therefore, estimated as follows:

	Pounds.
	55,000,000
	67,500,000
	82,500,000
	95,000,000
Total	300,000,000

wool of the above-mentioned years, and the imports referred to, less the ice in the amount on hand, comprise the amount manufactured in that

	Pounds.
it produced	300,000,000
nt imported	279,183,049
Total	579,183,049
average for consumption	144,795,762

estimate of consumption in the calendar year of 1864, made by this de- ent, was 160,000,000 pounds, and 120,000,000 of that aggregate were ed from actual returns of manufacturers. It is possible that the total gate, had it all been obtained from actual returns, would have exceeded

slightly 160,000,000 pounds, but the above showing of a wool supplj ceeding 145,000,000 pounds per annum for the four years would coı strongly the presumed accuracy of the estimate of last year. In th part of the war the mills were in operation night and day; in the la their running time was less, but their number and capacity were greateı

Thus it is seen that we manufacture double the amount of wool thaı in 1860, and that during the entire period of the war the increase over unprecedented consumption of that year averaged fully seventy-five

In addition to the amount of wool manufactured in this country, tne of woollens imported must be taken into consideration. The sum totaı pears from the following tables, was $87,782,918 during the same period is $21,945,729 for each year.

It will be readily seen from these figures that an average supply, in peace, of all needed woollens can very soon be attained if wool of the States is not displaced by low-priced foreign wools.

TABLE M.—*Giving a statement of wool imported during the year endi* 30, 1862.

Countries.	Wool.		Shoddy or
	Pounds.	Dollars.	Pounds.
Russia and dependencies	292,089	36,859	....
Hamburg and Bremen	208,799	35,037	1,875,930
Holland and Dutch colonial possessions	24,730	3,255	51,154
Belgium	1,023,439	157,893	643,904
England, Scotland, and Ireland	16,006,963	2,699,049	3,322,658
Canada and British North American possessions	100,072	11,149	1,135
British West Indies and South American possessions	44,651	5,007	1,980
British possessions in Africa and Mediterranean	3,920,257	665,480	....
British East Indies and Australia	783,670	112,118	....
France	4,438,429	813,373	391,728
Spain and Canary Islands	425,803	63,525	....
Spanish West Indies, Cuba, and Porto Rico	94,808	9,680	....
Portugal and Portuguese colonies	129,275	18,106	....
Italy	429,793	59,433	2,588
Austria	112,610	16,983	....
Turkey in Europe, Asia, and Egypt	3,710,506	392,616	....
Mexico	31,209	3,560	....
New Granada and Venezuela	207,417	22,193	....
Brazil	618,481	88,574	....
Uruguay	14,061	1,386	....
Buenos Ayres	5,786,868	838,850	....
Chili	2,793,501	289,895	....
China and Japan	7,714	857	....
Sandwich and Pacific Islands	10,926	1,112	....
Liberia and Western Africa	438,170	78,777	....
Total dutiable wool	41,654,241	6,624,767	6,291,077
Under reciprocity treaty	1,916,785	569,839	....
Total	43,571,026	7,194,606	....

BLE N.—*Giving a statement of wool imported during the year ending June 30, 1863.*

Countries.	Wool.		Shoddy.	
	Pounds.	Dollars.	Pounds.	Dollars.
sia and dependencies	1, 758, 367	275, 651	68, 412	5, 470
mburg and Bremen	356, 461	85, 690	2, 179, 508	137, 066
lland and Dutch colonial possessions	88, 619	11, 593	26, 186	1, 627
lgium	2, 988, 889	493, 312	691, 326	45, 213
gland, Scotland, and Ireland	17, 619, 123	3, 384, 866	3, 652, 569	325, 382
braltar and Malta	598, 241	67, 341	....	....
nada and British North American possessions	52, 872	9, 243	15, 789	1, 125
itish West Indies, Central and South America	8, 610	905	....	....
itish possessions in Africa	6, 711, 975	1, 179, 707	....	....
itish East Indies and Australia	118, 234	16, 753	....	....
ance	9, 643, 764	1, 632, 843	1, 195, 078	62, 977
ain and Canary Islands	981, 468	152, 730	6, 055	292
anish West Indies, Cuba, and Porto Rico	72, 409	11, 577	....	....
rtugal and colonies	167, 903	27, 492	....	....
ly	328, 284	51, 038	13, 518	495
rkey in Europe and Asia	4, 213, 473	618, 776	....	....
xico	1, 226, 820	155, 450	....	....
uth America	22, 481, 521	3, 168, 434	19, 160	1, 587
ina and Japan	19, 750	2, 287	....	....
ndwich Islands and whale fisheries	38, 906	4, 954	....	....
rts in Western Africa	2, 442, 065	421, 522	....	....
Total dutiable wool	71, 917, 754	11, 772, 164	7, 867, 601	581, 234
Under reciprocity treaty	1, 980, 053	781, 867	....	....
Total	73, 897, 807	12, 554, 031	....	....

ABLE O.—*Giving a statement of wool imported during the year ending June 30, 1864.*

Countries.	Wool.		Shoddy or flocks.	
	Pounds.	Dollars.	Pounds.	Dollars.
ssia and dependencies	4, 643, 305	801, 291	....	....
nmark, Norway, and Swedish West Indies	44	3	....	....
mburg and Bremen	390, 142	106, 723	1, 850, 283	130, 852
lland colonial possessions	16, 006	1, 615	7, 989	579
lgium	1, 511, 347	343, 941	697, 012	51, 273
gland, Scotland, and Ireland	13, 099, 501	2, 715, 843	4, 944, 133	379, 461
braltar, Malta, and Greece	244, 678	38, 236	....	....
nada and British North American provinces	12, 936	2, 579	44, 005	3, 654
itish West Indies and Central and South America	1, 101	166	....	....
itish possessions in Africa	13, 717, 900	2, 415, 145	....	....
itish Australia and East Indies	864, 548	177, 209	....	....
ance	10, 945, 299	1, 771, 423	541, 200	53, 920
ain and Canary Islands	179, 722	28, 734	....	....
anish West Indies, Cuba, and Porto Rico	5, 529	1, 255	....	....
rtugal and colonies	230, 914	38, 407	....	....
ly	1, 261, 078	65, 400	48, 481	1, 756
rkey in Europe, Asia, and Egypt	5, 534, 693	805, 115	....	....
xico	702, 676	96, 111	....	....
ntral America	114	21	....	....
uth America	31, 134, 935	4, 729, 014	288	19
ina and Japan	63, 069	7, 666	....	....
ndwich Islands and whale fisheries	169, 838	30, 272	....	....
her Pacific ports	8, 522	1, 236	....	....
her ports in Africa	2, 455, 565	417, 735	....	....
Total dutiable wool	87, 193, 462	14, 595, 140	8, 133, 391	621, 514
Under reciprocity treaty	3, 202, 642	1, 328, 851	....	....
Total	90, 396, 104	15, 923, 991	....	....

[illegible] exhibiting the quantity and value of wool imported into the United States during the year ending June 30, 1865.

	Wool on the skin and wool skins.	Wool: value 12 cents per pound or less.		Wool: value over 12 cents and not over 24 cents per pound.		Wool: value over 24 cts. and not over 32 cts. per pound.		Wool: value over 32 cents per pound.		Wool, scoured: value over 32 cts. per pound.		Woollen flocks or shoddy.	
	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.
[illegible]		212, 770	27, 685	258, 836	54, 392								
Russia ... Black [illegible]		1, 086, 432	111, 166	1, 190, 441	228, 315								
[illegible]	79	4, 700	538	682	144								
Hamb[illegible]				104, 495	13, 383							1, 286, 731	92, 447
Bremen	1, 656			150	28							175, 589	13, 111
Holland												6, 254	351
[illegible]	140	9, 617	1, 060	2, 430	367								
[illegible]		6, 413	851	31, 113	6, 370			6, 704	5, 212	47, 524	26, 587	317, 718	26, 115
England	2, 408	676, 668	74, 052	1, 298, 714	260, 495	3, 062	1, 022	1, 732	941			2, 866, 969	256, 455
Gibraltar				71, 573	12, 638								
Canada						20	5					1, 900	240
British [illegible] possessions on the Pacific		6, 302	646										
British West Indies	851	1, 027	101	55, 388	9, 580	189	55						
British possessions in Africa	55, 297	32, 290	3, 807	8, 279, 973	1, 529, 989			505	198				
British East Indies		138, 860	16, 611	605, 273	127, 856	27, 773	8, 236	6, 059	2, 293				
Australia	3, 802			408, 592	90, 573								
France: Atlantic								92	122			179, 271	20, 307
France: Mediterranean		111, 305	15, 851	737, 290	126, 698							28, 632	1, 369
[illegible]				234, 985	38, 506								
Portugal		2, 009	131										
Cape de Verde Islands		1, 874	211										
Italy				63, 107	13, 892								
Austria				32, 946	7, 527								
Greece		234, 852	26, 792										
Turkey in Europe		135, 007	10, 758										
Turkey in Asia		353, 240	41, 589	102, 300	20, 072								
Other ports in Africa		645, 719	93, 198	895, 056	154, 878								
Hayti	20												
Mexico	1, 468	257, 969	29, 371	81, 481	14, 651								
Central America	9												
New Granada		47, 132	4, 353	24, 020	4, 394								
Venezuela													
Brazil		261, 982	29, 380	615, 447	90, 644								
Cisplatine Republic	2, 567	188, 364	19, 022	975, 896	177, 979								
Argentine Republic	39, 470	9, 859, 618	1, 199, 056	6, 244, 271	1, 024, 697								
Chili		3, 019, 861	305, 581	342, 612	64, 614								
Sandwich Islands		3, 236	365	28, 497	4, 783								
China				906	125								
Countries not enumerated	826			294, 694	66, 672								
Total dutiable	108, 593	17, 297, 247	2, 012, 175	22, 981, 168	4, 144, 262	31, 044	9, 318	15, 092	8, 766	47, 524	26, 587	4, 863, 064	410, 395

Wool imported under reciprocity treaty, 3,486,070 pounds; value, $1,527,275. Total, 43,858,154 pounds; value, $7,728,383, exclusive of wool on the skin and shoddy.

Years.	WOOL.		SHODDY OR FLOCKS.	
	Pounds.	Dollars.	Pounds.	Dollars.
....	41,654,241	6,424,767	6,291,077	442,376
....	71,917,754	11,772,064	7,867,601	581,234
....	87,193,462	14,595,140	8,133,391	621,514
....	40,372,075	6,201,108	4,863,064	410,395
'otal	241,137,532	38,993,079	27,155,133	2,055,519

; is the amount of wool bearing a duty, which has been imported in this

.ddition, the amount introduced free under the reciprocity treaty with Britain is as follows:

Years.	Pounds.	Dollars.	Cents per pound.
....	1,916,785	569,839	29.7
....	1,980,053	781,867	39.5
....	3,202,642	1,328,851	41.4
....	3,486,079	1,527,275	43.8
Cotal	10,585,559	4,207,832	39.6

: total foreign supply of our woollen manufactures in the four years re- was, therefore, as follows:

	Pounds.	Cost.
e wool	241,137,532	$38,993,079
m Canada	10,585,559	4,207,832
1862 from other countries	304,825	55,539
....	27,155,133	2,055,519
Total	279,183,049	45,311,969

: Q.—*Giving a statement of woollens imported for four years ending June 30, 1865.*

	1862.	1863.	1864.	1865.
ı cloths and shawls .	$5,547,644	$5,147,404	$10,698,035	$5,257,819
s	1,945,707	1,297,864	749,793	838,741
ı and worsted yarns.	372,523	383,011	434,549	393,130
s and dress goods...	17,229	1,744,639	10,069,768	7,817,139
....	466,596	1,016,562	1,658,380	471,659
s	30,798	....	457,410	83,329
l lasting	68,485	....	102,910	87,213
rs	6,435,412	10,822,145	7,968,491	5,398,533
'otal	14,884,394	20,411,625	32,139,336	20,347,563

Total woollens imported, 1862	$14,[illegible]
Total woollens imported, 1863	20,4[illegible]
Total woollens imported, 1864	32,139,336
Total woollens imported, 1865	20,347,563
Total for four years	87,782,918

TABLE R.—*Giving a statement of exports of wools and woollens.*

Years.	PRODUCT OF UNITED STATES.			PRODUCT OF FOREIGN COUNTRIES.		
	Wool.		Woollen goods.	Wool.		Wo[illegible] go[illegible]
	Pounds.	Dollars.	Dollars.	Pounds.	Dollars.	Dollars.
1861	....	237,846	....	199,226	56,432	....
1862	1,153,388	296,225	....	332,953	76,708	221,570
1863	355,722	178,434	....	414,427	109,403	206,127
1864	155,482	66,358	81,943	223,475	134,634	120,190
1865	446,182	254,721	132,544	658,582	288,501	431,[illegible]

The exports, as heretofore, are of trifling amount. The exports of woollen goods of American manufacture were scarcely deemed worthy of separate enumeration, until 1864, in official summaries.

AGRICULTURAL EXPORTS.

TABLE S.—*Giving a statement of the exports of the growth and agri[illegible] products of the United States, with their immediate manufactures, for years ending June* 30, 1862, *and June* 30, 1863.

Products and manufactures.	1862.		1863.	
	Quantity.	Value.	Quantity.	Value.
Of animals:				
Hogs .... number..	3,306	$23,562	9,467	[illegible]
Pork .... tierces..	2,102	3,980,153	1,155	4,[illegible]775
Do .... barrels..	305,949		326,119	
Hams and bacon.... pounds..	141,212,786	10,290,572	218,243,609	18,658[illegible]
Lard .... pounds..	118,573,307	10,004,521	155,336,596	15[illegible]
Lard oil .... gallons..	239,608	14[illegible],056	1,259,063	[illegible]
Horned cattle ..... number..	3,634	197,019	5,509	[illegible]
Beef .... tierces..	57,234	2,017,077	56,372	2,185[illegible]
Do .... barrels..	50,171		61,739	
Tallow .... pounds..	46,773,768	4,026,113	63,792,754	6,[illegible]486
Hides	....	518,687	....	[illegible],855
Butter .... pounds..	26,691,247	4,164,344	35,172,415	6,[illegible],743
Cheese .... pounds..	34,052,678	2,715,892	42,045,054	4,216,804
Candles .... pounds..	6,100,029	901,330	6,838,353	1,187,864
Soap .... pounds..	9,986,984	636,049	9,097,664	736,524
Horses .... number..	1,534	157,442	1,296	132,549
Mules .... number..	3,237	212,187	3,561	332,233
Leather and morocco skins...	....	13,049	....	18,719
Leather .... pounds..	1,775,556	389,007	2,203,284	634,574
Boots and shoes ...... pairs..	679,594	721,241	1,214,468	1,329,009
Sheep	....	34,600	....	39,504

TABLE S—Continued.

:ts and manufactures.	1862.		1863.	
	Quantity.	Value.	Quantity.	Value.
als:				
..............pounds..	1,153,388	296,225	355,722	178,434
and furs..............	....	794,407	....	2,226,275
..............pounds..	142,312	47,383	258,901	80,899
..............barrels..	66,767	238,923	174,502	364,628
..............bushels..	417,138	300,599	517,530	413,581
....	....	90,412	....	122,422
uffs:				
a corn.........bushels..	18,904,898	10,387,383	16,119,476	10,592,704
a meal.........barrels..	253,570	778,344	257,948	1,013,272
t..............bushels..	37,289,572	42,573,295	36,160,414	46,754,195
..............barrels..	4,882,033	27,534,677	4,390,055	28,366,069
neal...........barrels..	14,463	54,488	8,684	38,067
oats, &c..............	....	2,364,625	....	1,833,757
....	....	156,899	....	83,404
it or ship-bread........	....	490,942	....	582,268
and cordage......cwt..	19,390	199,669	29,011	409,050
Sea-island.....pounds..	66,443	1,180,113	527,747	6,652,405
other kinds...pounds..	4,998,121		10,857,239	
piece goods:				
ed or colored...........	....	578,500	....	630,558
e, other than duck......	....	508,004	....	254,751
....	....	221,685	....	69,526
her manufactures of....	....	1,629,275	....	1,951,576
seed..........bushels..	66,064	295,255	389,554	2,185,706
ed............bushels..	15	59	40,759	96,805
oil...........gallons..	25,062	20,893	25,131	29,861
....	....	875,841	....	1,277,735
..............tons..	124	8,300	546	70,348
ll manufactures of.....	....	31,940	....	123,656
..............pounds..	630,714	408,590	372,945	295,129
..............pounds..	4,851,246	663,308	8,864,081	1,733,265
f turpentine..gallons..	43,507	54,691	58,565	143,777
..............bushels..	397,506	228,109	584,901	277,838
e, porter, and cider.....	....	54,696	....	129,176
rom grain....gallons..	768,295	328,834	2,633,391	1,390,610
rom molasses..gallons..	2,496,220	715,694	2,908,436	1,064,717
rom other mat's..galls..	3,956,359	1,577,909	1,855,098	950,245
s.............gallons..	45,009	21,914	39,290	19,465
..............gallons..	268,927	29,701	256,956	34,431
brown.........pounds..	1,284,849	90,022	380,348	31,497
efined........pounds..	1,470,403	147,397	3,214,661	361,034
....	....	12,325,356	....	19,752,076
), manufactured........	4,071,963	1,068,730	7,025,248	3,384,544
..............pounds..	38,839	7,914	44,924	13,633
nd its products:				
s and heading.....M..	....	7,917,417	....	14,342,058
les...............M..				
s, plank and scantling, M feet..				
timber..........tons..				
lumber..............				
ark and other dyewood				
factures of wood.......				
ot and pearl.....cwt.	74,895	457,049	61,313	513,704
pitch.........barrels..	9,765	55,884	11,956	102,566
d turpentine..barrels..	65,441	293,400	17,025	237,991

TABLE T.—*Giving a statement of the exports of the growth and agricultural products of the United States, with their immediate manufactures, for the years ending June* 30, 1864, *and June* 30, 1865.

Products and manufactures.	1864.		1865.	
	Quantity.	Value.	Quantity.	Value.
Of animals:				
Hogs ....number..	9,199	$86,907	1,400	$12,771
Pork ....tierces..	....	....	838	6,843,135
Do ....barrels..	317,597	5,828,030	207,294	
Hams and bacon...pounds..	110,886,446	12,323,327	45,990,712	10,521,702
Lard ....do....	97,190,765	11,260,728	44,342,295	9,107,435
Lard oil ....gallons..	440,546	377,994	99,250	155,454
Horned cattle.....number..	6,191	117,573	9,588	159,179
Beef ....tierces..	....	....	50,392	3,304,771
Do ....barrels..	178,332	3,023,018	59,822	
Tallow ....pounds..	55,197,914	6,215,260	30,622,865	4,979,135
Hides ....number..	56,071	305,111	205,950	1,023,596
Butter ....pounds..	20,895,435	6,140,031	21,388,185	7,234,173
Cheese ....do....	47,751,329	5,638,007	53,089,468	11,684,927
Candles ....do....	5,765,869	1,068,882	5,017,712	1,259,168
Soap ....do....	8,185,088	790,872	7,327,834	983,477
Horses ....number..	821	72,674	690	110,270
Mules ....do....	15	2,488	350	52,115
Fine leather and morocco, skins..	....	21,108	....	150,828
Leather ....pounds..	824,762	290,657	1,287,407	517,717
Boots and shoes......pairs..	755,792	1,415,775	522,308	2,023,210
Sheep ....number..	9,301	39,185	13,782	72,198
Wool ....pounds..	155,482	66,358	466,182	254,721
Skins and furs	....	1,795,417	....	1,648,863
Wax ....pounds..	341,458	170,418	338,776	261,381
Apples ....barrels..	183,969	487,140	120,063	479,256
Potatoes ....bushels..	463,212	473,911	510,344	724,593
Onions	....	136,260	....	220,694
Breadstuffs:				
Indian corn.......bushels..	4,096,684	3,353,280	2,812,726	3,679,133
Indian meal ....barrels..	262,357	1,349,765	199,419	1,489,886
Wheat ....bushels..	23,681,712	31,432,133	9,937,152	19,397,197
Flour ....barrels..	3,557,347	25,588,249	2,604,542	27,222,031
Rye meal............do....	6,999	37,991	3,935	32,438
Rye and small grains.bushels.	893,809	957,394	691,152	846,444
Rice ....barrels..	5,442	84,217	2,395	63,430
Biscuit or ship bread........	....	660,324	....	771,952
Cables and cordage.......cwt..	39,945	553,497	52,419	972,348
Cotton, Sea-island ....pounds..	132,521	127,783	330,584	296,179
other kinds .....do....	11,860,390	9,768,071	6,276,582	5,424,370
Cotton piece goods:				
Printed or colored..........	1,596,235	401,411	1,080,521	618,223
White, other than duck......	177,065	56,639	100,265	44,742
Duck	62,621	50,239	77,618	101,796
All other man'fact'r's of cotton.	....	948,612	....	2,566,821
Clover-seed ....bushels..	2,384,857	501,175	2,169,426	446,845
Flax-seed ....do....	1,708	5,808	39,369	120,091
Linseed oil............gallons..	143,301	81,751	64,913	110,156
Oil-cake	60,811	1,609,833	36,512	2,267,393
Hemp............tons..	1,751	246,257	2,111	259,393
all manufactures of	....	93,222	....	119,738
Ginseng ....pounds..	360,950	474,920	414,507	547,653
Hops ....do....	5,851,165	1,217,075	3,662,734	1,348,263
Spirits of turpentine...gallons..	32,548	87,988	42,518	95,747
Salt ....bushels..	635,519	296,088	582,803	355,469
ale, porter, and cider.....	....	126,317	....	163,151

Products and manufactures.	1864.		1865.	
	Quantity.	Value.	Quantity.	Value.
Spirits from molasses..gallons..	1,180,641	$527,115	1,149,859	$708,134
Spirits from other material.do...	369,222	332,786	218,551	394,770
Molasses ....do...	47,455	23,239	28,221	16,308
Vinegar ....do...	216,991	41,825	136,414	46,100
Sugar, brown ....pounds..	525,151	65,368	116,240	20,617
Sugar refined...........do....	1,803,332	259,937	1,309,522	284,906
Tobacco	....	22,845,936	....	41,592,138
Tobacco, manufactured........	8,587,472	3,631,070	7,297,878	3,580,245
Snuff.................pounds..	28,277	16,813	93,159	39,129
Wood and its products:				
Staves and heading.thousand.	44,103	2,458,266	33,029	2,911,310
Shingles ....do....	30,344	137,222	33,034	173,760
Boards, plank and scantling, M feet..	132,298	3,064,264	158,774	4,340,664
Hewn timber ....tons..	6,742	87,289	4,133	69,699
Other lumber................	....	1,642,976	....	3,422,719
Oak bark and other dyewood.	....	194,575	....	158,495
Other manufactures of wood.	....	865,281	....	1,254,888
Ashes, pot and pearl ......cwt..	48,904	468,626	52,677	727,229
Tar and pitch ....barrels..	7,156	70,782	11,529	76,034
Rosin and turpentine....do....	2,418	55,551	11,232	157,662

TABLE U.—*Being a recapitulation of exports of the growth and agricultural products of the United States, and their immediate manufactures, from* 1856 *to* 1865, *inclusive.*

	1856.	1857.	1858.	1859.	1860.
Animal productions...	$21,411,900	$20,593,413	$19,946,411	$17,602,413	$24,666,798
Breadstuffs	59,010,219	57,915,232	35,569,068	23,562,169	26,989,709
Wood and its products.	9,566,037	13,525,339	12,279,597	13,073,850	12,909,585
Cotton and its manufactures	135,349,660	137,691,036	137,038,165	169,751,145	202,741,351
Miscellaneous	20,497,763	28,477,756	26,198,678	30,700,573	26,783,464
Total	245,835,579	258,202,776	231,031,919	254,690,150	294,090,907

	1861.	1862.	1863.	1864.	1865.
Animal productions...	$27,715,392	$42,288,916	$68,011,371	$56,182,453	$62,361,126
Breadstuffs	73,534,544	84,340,653	89,263,736	63,463,353	53,502,511
Wood and its products.	9,089,434	8,723,750	15,196,319	9,044,832	13,292,460
Cotton and its manufactures	51,008,521	4,117,577	9,558,816	11,352,755	9,052,131
ellaneous	26,687,135	19,788,756	34,756,128	34,710,779	54,913,137
Total	188,035,026	159,259,652	216,786,370	174,754,172	193,121,365

ABLE V.—*Recapitulation of exports of the growth and products of the United States, with their immediate manufactures, for forty years, from 1826 to 1865, inclusive, in periods of five years each, with the total annual average for each period.*

Products and manufactures.	Five years ending 1830.	Five years ending 1835.	Five years ending 1840.	Five years ending 1845.	Five years ending 1850.	Five years ending 1855.	Five years ending 1860.	Five years ending 1865.
	Value.	*Value.*	*Value.*	*Value.*	*Value.*	*Value.*	*Value.*	*Value.*
Animals and their products	$23,011,879	$24,365,223	$20,309,261	$33,896,486	$63,473,863	$67,898,685	$104,220,935	$256,559,258
Breadstuffs	42,363,119	48,095,362	47,114,914	51,705,513	142,232,388	134,181,567	203,046,397	364,104,797
Wood and its products	15,632,507	17,403,004	20,043,813	19,331,158	20,383,180	30,248,638	61,354,408	55,346,795
Cotton and its manufactures	139,007,584	217,448,062	336,561,729	273,390,047	319,576,828	526,235,464	782,571,357	85,089,800
Miscellaneous	32,841,875	37,848,758	52,412,149	52,147,603	48,999,940	77,192,944	132,658,234	170,855,935

Annual average for each period of five years.

Animals and their products	$4,602,375	$4,873,044	$4,061,852	$6,779,297	$12,694,772	$13,579,737	$20,844,187	$51,311,851
Breadstuffs	8,472,623	9,619,072	9,422,982	10,341,102	28,446,477	26,836,313	40,609,279	72,820,959
Wood and its products	3,126,501	3,490,600	4,008,762	3,866,231	4,076,636	6,049,727	12,270,881	11,069,359
Cotton and its manufactures	27,801,516	43,489,612	67,312,345	54,678,009	63,915,365	105,247,092	156,514,271	17,017,960
Miscellaneous	6,568,375	7,569,751	10,482,429	10,429,520	9,799,988	15,438,588	26,531,647	34,171,187
Total annual average	50,571,390.	69,042,079	95,288,370	86,094,159	118,933,238	167,151,457	256,770,265	186,391,316

These tables, taken in connexion with those showing the quantity and total value of agricultural products in the United States, reveal the relative paucity of our exports, and yet show conclusively their great absolute value. A very small percentage of annual production comprises the surplus for the foreign demand. The cotton crop, though by no means the product of the greatest value, either at present or in the past, has attracted more attention than any other from the fact that it was mostly exported, and nearly all deported from the locality producing it. The export of raw and manufactured cotton is thus compared with other agricultural exports for ten years past.

Year.	Cotton and its manufactures.	Other products.	Year.	Cotton and its manufactures.	Other products.
1856	135,349,660	110,485,919	1861	51,008,521	137,026,505
1857	137,691,036	120,511,740	1862	4,117,577	155,142,075
1858	137,038,165	93,993,754	1863	9,558,816	207,227,554
1859	169,751,145	84,939,005	1864	11,352,755	163,401,417
1860	202,741,351	91,349,556	1865	9,052,131	184,069,234

While cotton has been the only article that is mainly exported, it is curious to observe that from 1826 to 1862, inclusive, its increase has been proportionately less than that of breadstuffs or animal productions—the increase in that period being as follows: Breadstuffs, 895 per cent.; animal productions, 818 per cent.; cotton and its manufactures (to 1860,) 629 per cent.; miscellaneous products, 199 per cent.; wood and its products, 178 per cent.

The animal productions for the five years ending in 1830, averaged only $4,602,375; for the five years ending in 1865, the average reached $51,311,851. Breadstuffs for the same period averaged, respectively, $8,472,623 and $72,820,959. The principal items of breadstuffs exhibit a wonderful increase during the last six years.

	1860.	1861.	1862.
Indian corn	2,399,808	6,890,865	10,387,383
Indian meal	912,075	692,003	778,344
Wheat	4,076,704	38,313,624	42,573,295
Flour	15,448,507	24,645,849	27,534,677

	1863.	1864.	1865.
Indian corn	10,592,704	3,353,280	3,679,133
Indian meal	1,013,272	1,349,765	1,489,886
Wheat	46,754,195	31,432,133	19,397,197
Flour	28,366,069	25,588,249	27,222,031

The total for five years, of breadstuffs of all kinds, $364,104,797, shows in a conspicuous light the marvellous resources of this country, in view of the withdrawal from the pursuits of agriculture of so many able-bodied men in the national and insurgent armies, and the shutting up of all the southern ports to the commerce of the world. Yet how small a percentage is this fifty millions per year of the total value of the bread crops of the entire country! And since the close of 1865 the almost total stoppage of this class of exports shows how utterly

unreliable is a dependence upon a foreign market for a demand for any existing surplus. If crops in Europe are good, and plenty reigns in the ports of the Black sea, our wheat is not wanted in Great Britain; but if starvation stares in the face the English poor, we are permitted, in a limited degree, to fill their mouths and our own pockets.

NEW YORK CATTLE SUPPLY FOR 1865.

The following is the statement of the cattle supply of New York for the year 1865, as prepared by the cattle market reporter of the New York Tribune:

ANNUAL RECEIPTS, 1854–1865.

Year.	Beeves.	Cows.	Calves.	Sheep.	Swine.	An. totals.
1854	169,864	13,131	68,534	555,479	252,326	1,059,386
1855	155,564	12,110	47,969	588,741	318,107	1,132,491
1856	187,057	12,857	43,081	452,739	345,911	1,051,645
1857	162,243	12,840	34,218	444,036	288,984	942,321
1858	191,874	10,128	37,675	447,445	551,479	1,238,601
1859	205,272	9,492	43,769	404,894	399,685	1,068,092
1860	226,933	7,144	39,436	518,750	323,918	1,116,181
1861	222,835	5,749	32,368	512,366	559,421	1,333,229
1862	239,486	5,378	30,465	484,342	1,148,209	1,907,880
1863	264,091	6,470	35,709	519,310	1,101,617	1,027,203
1864	267,609	7,603	75,621	782,462	660,270	1,789,347
1865	273,274	6,161	77,991	836,733	573,197	1,761,355

ESTIMATED AVERAGE PRICE OF BEEF CATTLE PER POUND EACH YEAR, 1854.1865.

Year	Price	Year	Price
1854	per lb. 9 c. full.	1860	per lb. 8 c. full.
1855	10 c.	1861	7¾ c.
1856	9½ c. nearly.	1862	7⅜ c.
1857	10⅓ c. nearly.	1863	9¼ c.
1858	8⅛ c. nearly.	1864	14⅓ c.
1859	9 c.	1865	16 c.

The prices are unprecedented, and the value of the beef alone is estimated at $31,296,720, at 700 pounds each, and 16 cents per pound.

WOOL PRODUCTS OF THE PACIFIC COAST*.

Year.	Pounds.	Year.	Pounds.
1854	175,000	1860	3,260,000
1855	360,000	1861	4,600,000
1856	600,000	1862	5,530,000
1857	1,100,000	1863	6,857,000
1858	1,428,350	1864	6,275,855
1859	2,378,250	1865	5,250,000

*This estimate, with the exception of the figures for the last two years, is made upon the authority of James E. Perkins, secretary of the California Wool-growers' Association.

IMMIGRATION AT NEW YORK.

MONTHLY ARRIVALS.

January	5,319	July	21,290
February	2,466	August	22,011
March	6,171	September	23,204
April	10,818	October	20,069
May	24,451	November	24,995
June	27,119	December	12,118
		Total	200,031

CONCLUSION.

A review of the agricultural progress of the year warrants the exhibition, on the part of the farmer, of the utmost cheerfulness in the present and hopefulness for the future. Improvement has been rife, and skilled industry has secured its appropriate reward. Some of the crops were never, at any previous period, so large, and never were so high prices received, with one single exception.

For several years these statistics have been confined to the northern States. Arrangements are in progress for securing a full corps of reliable and intelligent correspondents in the hitherto unrepresented districts. Unfortunately this region would at present make a melancholy exhibition in agricultural statistics, the poverty of which may, perhaps, better be concealed. It is to be hoped that recuperation may be as rapid as deterioration and destruction have been; and that new life and energy may be infused into southern agriculture, new labor enlisted in agricultural production, new and improved machinery introduced, new processes learned, and a greater diversity attained in agricultural industries.

It is intended also to secure better facilities for recording the facts of agriculture in the Pacific States, and among the vast Territories between the Rocky mountains and the States of our western border. Such material will serve to give a completeness to future statistical presentations which has heretofore been wanting, and to perfect a system which has been necessarily imperfect in the beginning.

J. R. DODGE.

Hon. ISAAC NEWTON,
Commissioner of Agriculture.

ENTOMOLOGICAL EXHIBITION IN PARIS.

SIR: My visit, made under your orders, to the entomological convention, held in Paris in August and September, 1865, was productive of some interesting results which are herewith reported:

As European insects are liable at any time to be introduced into this country in roots, bark, wood, grasses, and seeds, their nature and habits cannot be too well studied or understood here. It is well known that several of the insects most destructive to our crops are of European origin, and I would suggest that all foreign seeds and plants imported by this department be subjected to a careful investigation, and, if found to be infested by any new or unknown insects, fumigation, or other thoroughly efficacious means of destroying them, should be used before distributing them through the country. One pair of new noxious insects will do more harm than hundreds of the well-known varieties, as the progeny might commit their ravages unsuspected till they multiplied past the possibility of extermination, while known and familiar ones would be watched and guarded against. An instance of this may be cited in the introduction of the orange scale insect into Florida a few years ago. The entire ruin of the orange crops of that State was said to be traceable to a single small mandarin orange tree which had been imported and planted in the midst of an old orange grove. Before the proprietor was aware of his danger his whole plantation was affected, and by means of cuttings, fruits, &c., the insects spread throughout the State, destroying not only the yearly orange crops, but, in many cases, sweeping off the groves themselves.

At the exhibition in Paris there were several insects shown as destructive to European crops, which are so similar in appearance to some of our common native species not suspected with us of injuring cereals or fruits, that I am inclined to think, when agricultural entomology shall be more thoroughly studied and developed, many of ours will be found nearly, if not quite, similar to theirs in food and habits; in other words, that some insects hitherto considered as predatory and beneficial may, upon examination, prove to be injurious.

Among the insects destructive to wheat there were two European rove beetles exhibited in the splendid collection of Mons. E. Mocquerys, of Evreux. This family of beetles has hitherto in this country been considered as beneficial to the farmer, almost all the carabidæ feeding upon other insects which are injurious to crops. The European "*Zabrus gibbus*," on the contrary, is stated to be "very destructive, gnawing the stems of the cereals, attacking them in the larva state in the pith, and especially destructive to barley and rye." Another carabus, *Broscus cephalotes*, (Linn.,) has the same habits, but is particularly damaging to wheat. It would be well, therefore, to examine further into the habits of our native *Pangus caliginosus*, which the farmers of Maryland consider as exceedingly destructive to wheat in stacks, immense numbers of them being found under every grain stack in the field. As the carabidæ are beneficial in general, I have always supposed these insects sought the stacks for shelter, and to feed upon other insects frequenting such situations. It is true that on two occasions I have observed the *Pangus caliginosus* on the top of grass, apparently feeding on the newly-formed seed, though it is possible their food might have been minute insects invisible to the naked eye.

The larvæ of the long-horned beetles in America are considered to feed prinally upon the wood and pith of trees and plants, but in Europe there is one,

alamobius gracilis, which is said to attack wheat. This insect is something ;e a small *saperda* or *oberea*, and Mr. Mocquerys states that it attacks the heat when flowering, piercing the stem, and working downwards from the top; bores through the joints, and passes the winter months in the lower part of ie plant. It is stated that these insects sometimes destroy a fourth part of the heat crop. Mr. Mocquerys, in his notes, refers to Mr. Guerin Meneville for iller particulars. As we know of no similar long-horned beetle in this country ossessing like habits, an inexperienced entomologist would not dream of looking for them in such situations, and possibly many of our dying wheat stalks, if xamined, may be found inhabited by some similar insect.

The larvæ of another European longicorn beetle, *Phytæcea ephippium*, which esembles our *oberea*, is said to be very destructive in fields of carrots, mining hannels in the roots. We have nothing of the kind described in this country.

The larvæ of *Agapanthus suturalis*, also a longicorn, lives in the interior of he great stems of lucerne. *Oberea linearis* (Linn.,) also destroys young branches f hazel and filbert by devouring the pith. Our *Oberea tripunctata* commits imilar depredations here on blackberry and raspberry bushes.

The wood of the oak is injured by the larvæ of *Clytus arctuatus*, an insect hich bears a striking resemblance in size, shape, color, and markings, to our *C. pictus*, or locust borer, which causes such destruction among locust groves.

The larvæ of various species of *Elateridæ*, or snapping-bugs, so called here, inder the name of wire-worms, cause much damage to the cereals, grasses, and egetables in Europe, by devouring the collar from the plant, or boring into and estroying the roots themselves. Although our naturalists here have numberless pecies of these insects in their collections, I doubt whether the history and abits of half a dozen of them have ever been studied at all when in the larva nd pupa state, excepting, perhaps, *Alaus oculatus*, and a few others, inhabiting ecayed wood. Indeed, it is much to be regretted that entomologists have not aid more attention to the earlier stages of most of our *Coleopteræ*, and I may ay of all our other orders also. The study of entomology, in most cases, in this ountry seems confined to the mere collecting of a certain order of insects, pinning them in cabinets, and classifying or subdividing into groups and species ccording to some slight variation in form or anatomical structure, without having the slightest knowledge of their natural history in any of the previous stages of larva or pupa. Much more credit is given to one who discovers any new or rare insect than to him who first traces the natural history and peculiar habits of any familiar species from the egg up to its perfect state. The collecting and classifying of insects is, indeed, indispensable to the proper study of entomology, and involves great labor and expense; still it is to be regretted that we have so few field naturalists who make the various transformations, habits, and food of insects their peculiar study.

The May bugs, (*Hanneton*, Fr.,) in both larva and perfect state, commit great ravages in certain districts in France. They differ in form and color from ours, but their habits are so precisely similar that they need not be described here.

I may mention, in passing, that I received a report from Maryland that the blossoms of the ailanthus tree were fatal to our much-dreaded rose bug, *Macrodactylus subspinosa*, thousands being found dead and dying under the blossoming trees, but whether the male or female tree the correspondent did not state, and I merely record it as a fact reported to the department.

The *Buprestidæ*, attacking wood, have much the same habits as our native American species.

The *Curculionidæ*, or snout beetles, were very numerous in the various European collections, and are exceedingly injurious to crops there.

Among the *Attelabidæ*, *Rhynchites betulæ* (Fab.,) or *Coupe bourgeon*, destroys the leaves of the grape-vine by rolling them into a cylindrical form after having weakened the petiole, causing them to fall and perish.

The opium poppy, in Germany, is attacked by a small curculio, *Ceutorynchus macula alba*, which lives and undergoes its transformations in the seed v or poppy head.

Another curculio, *Lixus angustatus*, (Fab.,) is said to be very dest re in fields of beans; the larvæ mining into the stalks devour the pith, thus c the plant to wither and die. I have myself observed our American *Lixus concavus* burrowing into the footstalk of the rhubarb or pie plant, and then depositing a single egg in each hole. I endeavored to rear the young larvæ, but they died in a few days, as soon as the stalks became withered. I have no d however, that if the yellow decaying leaves of the rhubarb were exa many of them would be found to have been injured by this insect.

Two small curculios, *Anthonomus pomorum* and *pedicularius*, (Linn.,) pierce the flower buds of apples to deposit their eggs in them, which, after hatching into worms within the bud, devour the pistils and stamens, thus causing much injury to the crop. When grafting pears in the spring, and cutting open buds to see if they were alive, I have often found a single egg in the centre of a growing bud. These eggs being much too large for those of the small curculio, the question arises whether they may not have been deposited by some of larger species whose habits are as yet unknown, especially as it is said that European *Phyllobius oblongus* (Linn.,) gnaws and destroys the grafts of] and plums in that country.

The larvæ of *Baridius chloris*, (Fab.,) a small steel-blue curculio, injures the colza, producing the little galls or excrescences which are often found near the roots of that vegetable. In these galls they live and undergo their transformations. The larva of our native *Baridius trinotatus* burrows into and consumes the substance of the stalk of the common potato plant, and has been incorrectly supposed to be one of the primary causes of the rot.

Rhynchites bacchus, (Beemare,) a small bright copper-red curculio, pierces the young fruit of the apple and deposits its eggs therein, causing the fruit to fall much in the same manner as is done here by our codling moth. *R. cupreus*, a small copper-brown weevil, destroys the plum in the same way, but also makes a small notch in the footstalk which hastens its fall. I saw, however, no insect which approximates our plum weevil, *Conotrachelus nenuphar*, in either numbers, manner of attack, or destructiveness. Europeans may be thankful that as yet they have escaped this dreadful pest. *R. conicus* is of a blue-steel color, and deposits its eggs in the young buds of fruit trees. *R. alliaria*, also steel-blue, is very destructive to nurseries of young fruit trees, and injures them by cutting off the twigs and buds after having deposited their eggs therein.

The larvæ of *Anthonomus druparum* (Hbst.,) pierces the fruit of the cultivated cherry, while *A. incurvus* (Steph.,) does the same to the fruit of the wild cherry, and the stocks of the strawberry are cut off by *A. rubra*, (Hbst.)

A small metallic green beetle, *Polydrosus sericeus*, or the *Charançon argenté* of the French, devours the foliage and fruits of fruit trees, especially of grafts, and, when numerous, cause much injury; *Phyllobius pyri*, of a blacker copper color, but similar in form, and *P. argentatus*, of a bright metallic green, have the same habits; *P. betulæ* attacks pear trees especially; *Polydrosus micans*, of metallic copper lustre, attacks hazel and beech, while *P. planifrons*, or the *Charançon du grosselier*, destroys gooseberries.

The *Silphidæ* feed generally on carrion, snails, dead fish, &c., but Leunis states that the larvæ of *Silpha atrata* and others destroy the beets in Germany. In the Exposition it was also said that *Silpha atrata* and *lævigata* caused much injury by devouring the shoots and young leaves of the same plant. It would be well for us, therefore, to examine more carefully into the habits of the larvæ of our American species.

The more minute wood-eating insects, and those injuring forest trees, were very well represented in the exhibition; but as this report relates chiefly to

se affecting cereals, vegetables and fruits, I shall only mention *Synoxylon dentatum*, which attacks the stems of unhealthy grape vines, and *Xylopertha uata* (Fab.,) which injures the branches.

The *Chrysomelidæ* devour the leaves of trees and shrubs in the same manner ours. One of them, the *Crioceris asparagi* (Linn.,) which destroys aspara- in Europe, has of late been introduced into this country, and has already reased to such an extent as to become exceedingly destructive in some of States. This is another warning to use care that foreign insects be not orted and acclimated here.

This year I had a *Colaspis*, very similar to the *Colaspis strigosa*, brought to in Washington, and said to be very injurious to the foliage of the grape , in which the perfect insects eat innumerable small holes.

Among the European insects beneficial to farmers, I shall only enumerate a r of the principal species which were exhibited as destroying noxious insects.

The Cicindelidæ, or tiger beetles, feed entirely upon other insects, and were ll represented. Among the *Carabidæ*, the following were especially noticed: *Procrustes*, *Carabus*, *Calosoma*, *Pœcilus* and *Omascus*. Worms, slugs, snails, nd caterpillars are destroyed in immense numbers by the *Staphilinidæ*. *Silpha quadripunctata*, in the larva state, devours caterpillars, while, as before ticed, its relatives *S. Atrata* and *lævigata* feed upon the shoots and leaves n the beet root. *Carpophilus sexpunctatus* lives under the bark of pines, and lestroys great numbers of the *Bostrichidæ* which attack the wood. *Dasytes lavipes* and *Rhizophagus depressus* live exclusively upon the *Bostrichidæ*. *Trogosita mauritianica* (Linn.,) or *Cadelle*, was exhibited as being frequently ound in wheat granaries, where they destroy the larvæ of the wheat weevil nd other insects injuring grain. I have myself seen the larva of the *Trogosita lubia* in maize, where it had burrowed into a hole, and was apparently feeding n the interior of the grain. It is of some importance, therefore, to ascertain what they really do feed upon before destroying them.

Ditoma crenata (Fab.,) *Brontes planatus* (Linn.,) and *Silvanus tridentatus* Fab.,) were shown as destroying the larvæ of *Scolytus* and *Bostrichus*, which re both wood-eating insects. *Drilus flavescens* (Fab.) lives entirely on snails nd slugs, whilst the larvæ of *Telephorus fuscus*, and *lividus* (Linn.,) and *Rhagonycha melanura* (Oliv.,) are ever on the chase for soft larvæ, and the arvæ of the destructive saw fly. The larvæ of *Malachius æneus* feed upon ther grubs which inhabit the stems of plants. *Tillus elongatus* (Linn.,) *Thanasimus formicarius* (Fab.,) *Opilus mollis* (Linn.,) and *Hypophlæus bicolor* Fab.,) feed upon the larvæ of wood-eating insects. The larva of *Brachytarsus varius* (Fab.,) live especially on the *coccus*, or scale insect, infesting pine trees.

I may here remark that I have seen the perfect insect of our *Chilocorus bivulnerus* (a small black lady-bird, with two bright red spots on the wing cases) early in the spring busily employed in tearing open the cases of the white scale insect inhabiting our pines and devouring the eggs. I have also observed hat if they were disturbed in their repast, many, if not all the remaining eggs ell to the ground through the orifice made by the *Chilocorus* whenever the wind agitated the leaves. In Florida the *Exochomus guexi*, a very small red coccinella, with black thorax and two black spots on each wing case, was bserved to act in similar manner with the orange scale or coccus. Indeed, lmost all our *Coccinellidæ*, or lady-birds, are exceedingly beneficial by destroy- ng plant lice and scale insects, and I have even known them attack the newly- ormed chr is of a butterfly before the outer envelope had hardened. There s one excep , however, which must be mentioned, and that is the *Epilachna orealis*, a ge lady-bird, the larvæ of which are very injurious to the squash nd ot ts of that family.

Very of the other orders of insects beneficial to the agriculturist, such n flies, &c., were exhibited, the principal collections being mostly

of the coleoptera or beetles, and lepidoptera or moths, the caterpillars of whi are so injurious to vegetation. Mr. Mocquerys exhibited the finest collec consisting of thirteen large glass covered cases, containing specimens destructive European insects, with the root, wood or foliage as attacked, and short written description of the injury, and the scientific and common n and habits of the insect. This plan might be adopted with advantage in agricultural museums, and would be improved by adding references to the pages in Harris, Fitch, and other authors who have described the insects and prop remedies for their destruction.

Although so many insects injurious to the farmer were shown, very attention appeared to be paid to ascertaining remedies for them, except case of some specimens of the wood of forest trees destroyed by insects the bark. These were exhibited by Dr. Eugene Robert, and a label was attached to them stating that "the diseased or infected trees can be cured, restored to pristine vigor, by a process of decortication or stripping off outer bark by means of certain instruments, such as scrapers, &c., at a parti season of the year." This he states he has done, and with the most benef results, and proves his statements correct by exhibiting in his collection woods which he has thus operated upon, the label attached to these specimens reading as follows:

"Dressing founded on vegetable physiology of the trees injured by *Xylophagu* (wood-eating insects,) by means of the method of superficial decortication, or taking off the old bark to the liber exclusively, &c." Considerable caution would be necessary in trying this experiment, as there might be great danger of killing the tree, and any farmer attempting it will do it at his own

The Imperial Society of Horticulture of the Rhone suggest that, as which infest plants have a horror of vinegar, this article be used as a preventive of their ravages. It is alleged by M. Denis, director of the School of Arboriculture, of Lyons, that last year's experience showed that trees sprinkled with a solution of nine parts water to one of vinegar bore fruit abundantly, while those not so treated produced scarcely any. It may be applied to flower beds or fruit trees by means of a garden syringe or a watering-pot with a fine rose.

Many specimens of the various powders for destroying insects were exhibited, and are at present very popular in Paris. The basis of all is supposed to be the powdered flowers of the Pyrethrum, a plant very nearly allied to our wild cammomile, or feverfew. The almost impalpable powder is blown from a bellows, or other instruments made for the purpose, and, if perfectly fresh, and from the dried flowers alone, is reported to be very effective in destroying insect life. If powdered stalks and leaves be mixed with the flowers, it is not so good; and if the powder is exposed to the air, it loses its effect. Growing plants of the Caucasian Pyrethrum, *P. willemottii*, *P. roseum*, with smooth green leaves and pink flowers, and *P. rigidum* having leaves covered with short, cotton-like hairs, and bearing a white flower, like our common ox-eye daisy, were also in the exhibition; and as seeds of all these have been received by the department at Washington, it is expected that some practical experiments will be made to test their real value as insect exterminators.

Apiculture, or the raising and breeding of bees, being one of the main features of the Exposition, there was a large display of hives, but nothing especially new or interesting to us. The Italian bees were recommended as being more peaceable and industrious than the common hive bee. Those exhibited were of a lighter color than ours, and had two broad light brown bands across the base of the abdomen.

The centre of the building was devoted mainly to the various species of silk-worms, their culture and products. Among these the ailanthus silk-worm, *Attacus cynthia*, appeared to attract the most attention. According to the statements of M. Guerin Meneville, this insect is now accli-

mated in France, and promises great results, as the worms may be reared in the open air upon growing ailanthus trees. The cocoons being suspended to the branches by means of a silken web fastened to the foot-stalks, remain hanging on the tree, and can be gathered without trouble. The silk is also said to be very strong and durable. The culture of the ailanthus silk-worm has been made more necessary in that country on account of a fungoid growth which has attacked and destroyed immense numbers of the common or Chinese silk-worm, (*Bombyx mori,*) in several parts of Italy and France. The ailanthus worm seems more hardy, and, it is hoped, may take the place of the other, should the disease continue. In this country, however, it is to be feared that the culture of the *Attacus cynthia*, for silk-producing purposes, will prove a failure, as, owing to the attacks of parasitical insects and birds, comparatively few worms would complete their transformation without protection. This, added to the high price of labor and the great trouble and expense of attending a large plantation of worms, will prevent the business from being profitable.

While speaking of the ailanthus, I would call attention to the following statement, which seems to indicate that the tree may perhaps be found more useful than is generally supposed. This notice was attached to a large piece of wood in the exhibition:

Results of experiments made at the port of Toulon, in 1865, *by M. Roul, engineer of bridges and highways, upon the tenacity and density of the wood of the ailanthus, as compared with stronger wood :*

	Tenacity.	Density.
Ailanthus, three experiments, average	32.812	0.713
Elm, seven experiments, average	24.867	0.604
Oak, ten experiments, average	19.743	0.751

The wood is also said by some to make good fuel, and not to give out an unpleasant odor in burning. But this remains to be proved.

To this may be added the following facts, reported to the department by Mr. W. R. Grosh, of Elkton, Maryland :

"About ten years ago a wharf was built at Marietta, Pennsylvania, between the Susquehanna river and the canal, in which was a post of the ailanthus. It was subject to all the changes of dryness and moisture incident to canal banks. When the tow-path was changed to the river side of the canal, and the wharf removed, this post was found to be perfectly sound.

"On another occasion a neighbor had a lot of ailanthus posts. Some he set in the ground, immediately after they were cut; they proved to be no more durable than posts of pine. The remainder he set when they were seasoned, and they proved, after eight years of trial, about as good as locust. To see them now one would suppose they might last always.

"These cases seem to indicate that the ailanthus is equal to the best timber for posts, if properly seasoned. It is also pronounced equal to oak, or even hickory, for fuel, by those who have used it. As it is a rapid grower, and easily raised from seed, it would prove valuable for belts and groves on our western prairies, if far enough from residences to render the odor of its blossoms endurable."

Bombyx mori, or the common silk-worm, was represented in all its forms and products. The other new or imported silk-producing insects, *Bombyx yama mai*, from Japan, which feeds upon oak ; *B. pernii*, from China, food also oak ; and *B. Faidherbia*, or *Bauhiniæ*, so named from the plant upon which it feeds, were exhibited, and are now being experimented with by Monsieur Guerin Meneville and others, to test their qualities and capabilities of culture in Europe. Two of our native moths, *Attacus cecropia*, and *Polyphemus*, were also in the exhibition, and I believe them to be of equal value with the others. Mr. Trouvelot, of Medford,

Massachusetts, has succeeded in raising *A. polyphemus* in numbers sufficient to test its value as a silk-producing insect.

As my instructions required me to examine the various museums and botai gardens, in order to learn the best system or plan for forming an agricu and economic museum, to be attached to the Department of Agriculture o United States, much of my time was taken up in visiting the garden of j museum, gardens of acclimation, and other similar institutions in Paris. I i that the system of classification in the permanent exhibition of Algiers and colonies, approaches nearer what we require than any other, and I shall t fore proceed to give a somewhat detailed account of it. The plan is that the museum is not only rendered interesting, but useful to all classes—to the manufacturer, the druggist, and, indeed, to men of all trades and prof Scarcely any one can visit such a collection, so arranged, without learning thing new or useful, and will frequently be astonished at finding things b looked upon as mere weeds or cumberers of the ground, rendered, by science industry, sources of both individual and national profit. Still, it lacks in one respect; although the name is attached to each object, there was no system of reference to books or works giving an account of the growth and habits of the seed or plant, or the methods of manufacture.

In the first place, the specimens are divided into series, and secondly into sections; so that any object may be found by referring to the number of the section and series, which is conspicuously printed in large letters on each case.

Series 1st contains vegetable substances and their products.

Series 2d contains mineral substances and their products.

Series 3d contains animals and substances manufactured from them

Series 4th contains productions taken from the water.

These series are then subdivided into sections, thus:

Series 1st, containing vegetable substances and their products, is divided into—

Section 1. Woods and bark, as cork, &c.

Section 2. All textile materials and their fabrics, excepting cotton.

Section 3. Cotton, cotton threads and tissues.

Section 4. Oils and saponaceous substances.

Section 5. Dyes and tanning substances.

Section 6. Gums, resins, and varnishes.

Section 7. Medicinal drugs, &c.

Section 8. Cereals, grains, forage plants, and legumes.

Section 9. Flour, meal, and pastes made from them, such as maccaroni, vermicelli, &c.

Section 10. Wines, alcohols, preserves, and confectionery.

Section 11. Essential oils, perfumes.

Section 12. Tobacco.

Section 13. Sundry industrial vegetable productions.

Herbarium, &c., fill up the other numbers, but as they are of comparatively little importance, I will close here. In these sections we want fruit, flowers, &c., between the woods and textile fabrics; cereals and grains might be put after, instead of where it now stands; and, indeed, the whole arrangement can be so modified as to be extremely simple and utilitarian.

Series 2d. Minerals:

Section 1. Substances metallic.

Section 2. Substances non-metallic.

Series 3d. Animals and their products.

Section 1. Wool, hair, and their products.

Section 2. Silks.

Section 3. Skins and leather.

Section 4. Wax and honey.

Section 5. Bone, horn, and turtle-shell.

we want separate sections for animals, birds, insects, &c., together with tents of the birds' stomachs, what particular insects are destroyed by in- l species of birds, and peculiar marks designating each specimen as in- or otherwise. We should also want specimens of draining tiles, &c., ineral substances, in order to show which are best for peculiar soils; and eral other useful agricultural articles.

ld the department ever succeed in forming such a museum, under the ies, section one, wood and bark, might contain longitudinal and cross , or triangular blocks, of all our native woods, with labels attached, he name, habits, density, tenacity, and peculiar uses of each, with ref- to the latest and most reliable works on the subject.

e section of textile materials and fabrics, excepting cotton, there were f the *Agave mexicana*, or aloe; the *Heliconea caribea*, or Brasilier; *xtilis*, or abaca; hemps of Saigon, a species of *Urtica*, or nettle, from China; also, string made from the fibre; *Coir*, or cocoanut fibre, of which rope is made; fibre of the *Ananas*, or pine-apple, apparently very good; *ang* and *Suntang*, hemp-like fibre from Cochin China—very fine and tly strong; fibre made from the stalks of the *Hibiscus esculentus*, or mon okra of our gardens; also fibre made from the *Bromelia kanatos* (?) ana. A curious kind of fibrous cloth is also made by beating the inner the *Broussonitia papyrifera*, or paper mulberry, in Tahiti, as likewise Dawron bark and *Ficus prolixa*, from New Caledonia.

ıg the oil-producing seeds and nuts was particularly noticed oil from ls of the *Melia azederach*, or Pride of China, a tree which grows most ly in our southern States. The oil, however, looked like a thin, yellow d did not appear to remain in a liquid state.

il from our common peanut, or pindar, *Arachis hypogæa*, was extremely clear, and might be made in the south with great advantage. In former ns of peanuts were shipped from the southern States, especially from Carolina, to France, where the oil was pressed and refined, and then re- o this country and sold as pure olive oil.

were also many fine samples of oil from cotton seed, melon, cucumis palm, Indian hemp, cocoanut, &c.

seum of this kind would be of the highest interest and utility, and might a perfect reference on almost any subject. Once commenced, it would arly from the contributions of agriculturists, naturalists, and others. It kewise serve as a record of the introduction of any new seed, root, fruit, into the country by means of the department; and as the name and ad- the donors would be attached to each specimen, they might readily be to in case of any further information being required on the subject. utions would doubtless multiply to such an extent that duplicate speci- ight be distributed to the different States, and in this way aid to form ricultural and economic museums.

e garden of acclimation I made brief notes of the various animals and ich are very rare or may be acclimated and in a measure domesticated The following are the principal:

r of auerochs, or bisons of Europe, lately presented to the society by the r of Russia, are very valuable, not only from their extreme rarity, but also the only living representatives in France of the true wild bison family— s now extinct excepting in Lithuanian forests, where the Emperor of carefully preserves a large herd. The specimens in the garden are not nd look much like our wild bison, or, as it is generally but wrongly buffalo. Their color is brown or blackish, and the hair on the head and rs is rough and shaggy. The real buffalo (*Bos bubalus*) is an entirely animal, which was originally introduced from the East Indies, and is nesticated in Italy and elsewhere. This animal is almost semi-aquatic

in its habits, and delights to wallow in swamps and muddy places; it swims well, and is exceedingly fond of being in the water, frequently submerging itself so that only the nose and part of the head are visible.

The yak, or grunting ox, *(Bos grunniens,)* or, as the French term it, horse-tailed ox, is originally from the cold regions of Asia and the Himalaya mountains. There are several specimens in the gardens of acclimation and the garden of plants; in the latter place, especially, may be seen a most magnificent white bull. These animals are covered with a very long, shaggy coating of hair, which reaches almost to the ground, and have long hairy tails, like the horse. The noise made by them resembles the grunt of a hog. The Tartars use the yak as a beast of burden, and in France it appears entirely domesticated. Crosses have been obtained between it and the common cow, and this cross is said likewise to be prolific.

The zebus, or hump-backed cattle of India, have also been acclimated in gardens. They are really beautiful animals. Their mild, placid looks, l intelligert eyes, sleek condition, and glossy, short, satin coat form a stri contrast with both the yak and the buffalo. Dr. Davis, of South Caroli eral years ago had a number of these Bramin cattle, and affirmed that he i them much better adapted to the intense heat of the south than c stock. He also claimed for them good milking qualities, and said that as w ing cattle they could not be excelled, their ordinary walking pace being ne as fast as that of a horse. I have also seen very fine specimens of tl in Demarara, and they would doubtless succeed very well in the warm cu of Georgia, Florida, and Louisiana. The zebu is reported to have been cr with the yak; if so, no doubt it could be with our common cattle.

Among the sheep and goats were several varieties of merinoes and the ong-ti or ti-ang, Chinese sheep, which are celebrated for their prolific qualities, although I believe they have not answered the expectations of our farmers after two or three generations.

The sheep of Yemen have the body and legs pure white, while the head and part of the neck are of an intense black. They have no wool, but only a kind of nap or short hair. For use they would probably be no improvement on our most common kinds, but might be ornamental on a lawn or in a small park.

The Angora or Cashmere goats resemble those bred in our country. They are white, and similar to the breeds imported by Dr. Davis, of South Carolina, and Judge Peters, of Georgia. In the description of the Angora goat given in the catalogue of the society, I find it stated that at the last exposition of agricultural products magnificent tissues were exhibited by M. Davin, which had been manufactured from these fleeces; so we may yet hope for success with the Angora in the United States.

The llama inhabits the elevated regions of the Andes. Their flesh is good, and their fleece valuable for manufacturing purposes. There appear to be both dark-red, brown, and white varieties. The alpaca lives under the same conditions as the llama, but is smaller, and the fleece is longer and more silky. The vicuna and guanaco live in a wild state in the most elevated regions of the Andes, near the limits of perpetual snow. These four species can be crossed, and their progeny is fertile. The administration of the garden, in order to tes these animals, have crossed the llama and alpaca, and the alpaca and guanac Their progeny has given satisfaction, the fleeces surpassing in quality those o their parents.

Among the horse tribe exhibited, the zebra holds the most conspicuous plac on account of its beauty, the whole skin being regularly stripped or barred wit black lines on a cream-colored ground, but the heavy head detracts from tl general air of grace and lightness of the other parts of the animal. The dau or Burchell's zebra is merely striped on the head, neck, and fore part of th

dy. They have bred and reproduced to the third generation at the Museum Natural History, and are said to be very tractable.

The hemione or wild ass of Tartary, *(Equus hemionus,)* when in its wild ite, is said to be one of the swiftest animals known. They are now acclima- d, and breed perfectly well in a state of semi-domestication. They have been cessfully crossed with the common donkey. From its reputed swiftness, rhaps, it might be advantageous to cross it with our common horse, in order produce an extra swift race of mules. The hemione resembles a large, good- oking, fawn-colored donkey, and has nothing particularly attractive in its ap- ance.

A Siamese pony in the stables was well made, very small, of a cream color, ith black mane and tail. The Shetland, in size and color, resembles a good- zed black Newfoundland dog, while the most pigmy pony in the collection is la- lled "The Island Pony," but where the island is there is none to tell. This ny is really worth seeing—it is so very small, of a black color, and perfectly ell formed.

I saw no true swine in the collection, the nearest approach to them being the llared peccary of Texas and South America. These animals have bred sev- al times in confinement, but their size being small, their tempers rather uncer- in, and their tusks unusually sharp, I do not think that, as a race of hogs, y are desirable.

The deer need not occupy space here, as we have enough of them in a wild state, id will merely remark that several of them might be introduced with advantage to the parks of our merchant princes, especially the fallow deer, *(Cervus dama,)* hich is particularly adapted to this purpose. The antelopes, gnus, &c., are so very pretty and interesting, but more for ornament than for any real use.

In the poultry yard one of the most interesting objects was the wild cock of imatra. He was the most game-looking fowl in the whole collection, resem- ing our black-breasted red game, the back being red, while the neck and breast ere of a rich dark metallic bronze. The tail was drooping and something ieasant-like, but shorter. This drooping might, however, be accounted for by e fright and agitation he evidently felt at being intruded upon by a stranger. e was excessively wild, and endeavored to hide himself behind a bush or in s house. The comb is single, very large and red. The wattles are pendant, rge, and red, excepting near the lower part of the head, where they are of a ost beautiful sulphur yellow. This gives the bird a very beautiful and singu- r appearance, the two colors contrasting so strongly with each other on the rk bronze of the neck.

Of the Sonnerat fowl, owing to his wildness, I am unable to give any descrip- excepting that in the cursory glance I had he appeared very much like a ge reddish bantam without feathered legs and with a drooping tail.

Our domestic fowls are generally supposed to have been derived from the kiva jungle fowl, though it is possible that other varieties may have assisted the production of the numerous breeds and varieties.

Among the other fowls I particularly observed the Houdan breed. These wls are medium sized, of a white and black checkered color, and one of their culiarities is that they have five toes, three of which are turned forward and o backward. The Creve Cœur are like our black top-knots. The La Fleche eed are tolerably large, and of a black color. The *Race Espagnole* is our Spanish. The Dutch *Race de la Campine* resembles our Creoles, but are ger. The Breda breed have feathered feet and legs, and very small or no top- ts. The male has no comb, but large pendant wattles. Of this kind there four varieties—the white, blue, black, and cuckoo or mottled. The breed Padua resembles our spangled top-knot Hamburgs, having the same plume of knot feathers on the head. Of these there are five varieties—the fawn color,

the gold, silver, white and spotted. The Holland Padua resembles our black fowls, with large white top-knots, sometimes called white top-knot Spanish.

The Brahma pootra fowls were introduced into France from Assam in about 1850, are very large, and have a simple dentated comb of medium size; their colors are white, checkered with black, and their legs and feet are heavily feathered. In the gardens are three varieties—the blue, the common, and "*la varieté inverse.*" The "*Race de Nankin,*" or Cochin China, are natives of the warm regions of China, and were introduced into France in 1846. They are splendid fowls, of a very large size, very clumsy in shape and gait, of a buff color, and with no tail to speak of; their feet are covered with feathers, and their comb is single and notched. Of these fowls there are four varieties on exhibition; the white, the cuckoo or mottled, the black, (the cock has a large single comb and wattles,) and the buff, this last being the original color found in China, the other colors having been bred in Europe.

The Russian fowl is large, the head and neck of the hens being curiously muffled with feathers of a cinnamon color, while the body is of a lighter tint. The Yokohama breed is originally from Japan; the male is distinguished by a long, drooping, plume-like tail. The color of this fowl is whitish, with some red on the wings. The Bruges breed is a game fowl of an iron gray color, with a short tail. The hens of this breed are celebrated as setters, while the males are said to make splendid fighting birds, and, to use a common expression, are "game to the backbone."

The Dorkings, imported from England, are fine fowls for the table; but the guide to the gardens describes them as delicate, and affected by severe frost and wet weather, though with how much truth I am unable to judge.

One of the most curious fowls in the collection is the Wallikiki (*Gallus ecaudatus*) from Turkey or Persia. This fowl has no tail whatever, not even the apology for one possessed by the Shanghai, but only long silky feathers falling over the place where the tail ought to be. There are also several very small fowls, or bantams, in the collection, the most singular of which is the "*Race Negre*" (*Gallus morio*) from India. They are covered with a fine silky down, instead of feathers, and present the appearance of a half-grown chicken. Their skin is said to be black, but this could not be discovered through the coating of long silken down which envelopes the entire body, neck, and head.

Some of the bantam chickens (*Gallus banticus*) originally, probably, from India, are remarkably pretty. One of the breeds is of a mottled gray color, our Dominiques, with fine rose comb and wattles and unfeathered legs. There are two varieties of these, the yellow or buff, and the golden. The white Java bantams are the most graceful and beautifully formed little white bantams in the whole collection. They have a blood-red rose comb and wattles, and no feathers upon their legs and feet. There is also a black variety of these Java bant which I did not observe. The Nangasaki bantams, originally from Japan, are of a whitish color, with some black feathers in the tail and wings. The cock had an immense single comb and wattles, the feet are very short, the head thrown back and almost touching the tail, wings nearly trailing on the ground, and short important gait.

The pheasants come next in order as being in a semi-domesticated state; of these, however, I shall merely mention a few of the most interesting. In the first place, the common pheasant, (*Phasianus colchicus,*) found in the wild state in the Caucasus and near the Caspian sea, is the most common species in Europe. It is a most beautiful bird, and has for a very long time been kept in a semi-domesticated state in the parks, woods, and pleasure grounds of wealthy persons, where it breeds almost as well as domesticated fowls. It roosts at night on elevated trees, and, like our domesticated Guinea fowls, loves to wander about the woods and fields. These birds ought by all means to be introduced into our ornamental parks and pleasure grounds, being at the same time useful

an article of food, as well as highly ornamental. There are five varie s here, viz: the common, the ring-necked, ash color, white, and parti-colored. ne ring-necked pheasant is said to be originally from China. The male of the lver pheasant, (*Phasianus nycthemerus,*) originally from the north of China, is st beautiful bird, of a silver white color, with regular, slender, lace-like black .rkings on the feathers of the back, while the under parts are of a black color; long, drooping tail is also silver white, barred with black. This bird is said be completely domesticated in France, where it is bred and reared with per- ct ease. The female is by no means as beautiful as the male, being of a dull ddish color, and of a smaller size. The golden pheasant, *Phasianus (thau- alea) pictus*, is one of the most beautiful and bizarre birds, bred in a state of alf-domestication, and is much smaller than either of the pheasants before men- oned. The under part of the male is of a red color, the head is ornamented ith a splendid golden yellow crest, the neck is hidden or overhung by a some- hat projecting ruff of feathers of a bright yellow color, striped or barred with lack. The wings are of a dull blue, the hind parts of the body are of a golden lor, set off with red, and the tail is long and brown, barred with black. The male of this species is also very inconspicuous in color. These birds have red well in some forests in Europe, and in a state of domestication have pro- uced three varieties, viz: the ordinary golden and red color, the black, and the ella or fawn.

he *Euplocomus* (*Gallophasis prelatus*) or blue pheasant is one of the most plendidly metallic-colored birds in the gardens. It was introduced from Siam nd Cochin China in 1862; it is of medium size, with crested head, and a back f the most brilliant metallic blue and gold, which, when reflected upon in the unshine, gives forth almost all the colors of the rainbow.

The Impeyan pheasant, *Lophophorus impeyanus*, or *refulgens*, is a most plendid bird. The male is nearly as large as a Brama fowl. It is from the igh montainous regions of Hindostan, and as it bears well the severe cold eather, it might be introduced into the United States. It breeds well in par- ial confinement, thirteen young ones having been raised in the gardens of the Zoological Society of London this season.

The *Song-ki (Crossoptilon auritum)* is from the mountains of the north of China and Thibet. This is also a most splendid bird; it is the size of a com- mon fowl, of a blackish color, with a whitish tail formed of long hackle or barbed slender feathers. Some of the feathers of the neck are white and elon- gated so as to form two horn-like appendages which project on each side of the top of the head, giving this bird a most singular and grotesque appearance.

The Guinea fowls *(Numida meleagris,)* originally from the north of Africa, are represented by four varieties, viz: the common, parti-colored, lilac, and white. There is also a species with blue cheeks, *(Numida ptilorhyncha,)* from Egypt and Senegal, of similar color and marking as our common Guinea fowl, but distinguished by the blue color of the cheeks and wattles, and by the much less disagreeable cry which it makes when disturbed or on its wanderings. The crested or helmeted Guinea fowl *(N. tiarata)* from Madagascar is thus named from the rounded crest on the top of its head, which has been compared to a tiara. Of the common peacock, originally from India, Malabar, Ceylon, &c., there are the common, white, and parti-colored varieties. The Japanese peacock from India differs from the common species in the blue color and metallic reflections of the neck; whilst the green-necked peafowl, *(Paon speciferus,)* from Cochin China and Indian Archipelago, is distinguished by the neck being of a green color. Our native American wild turkey is also here, and six varieties of the domesticated kinds, namely: the black, white, gray, parti-colored, red, buff or fawn. Our bronze-backed turkeys are probably a cross between the common black and our wild turkey, as in the descriptive catalogue of the garden of acclimation we find it stated that "the common and wild turkeys

cross readily, and that these crosses are much larger and more brilliant in color than the common tame varieties." "Oviedo was the first to speak of the turkey," and according to some historians the turkey existed in France in 1518 or 1520; according to others it was first introduced in Spain, whence it was introduced into England in 1524; and it is somewhat strange that no mention is made in this pamphlet of its supposed Mexican origin.

The swans, geese, and ducks next claim attention. Of the swans there are the red-billed or domestic, the black-billed or wild swan, and the black swan from New Holland and Van Dieman's Land. This last bird is of a jet-black color, with a bright scarlet beak, and as it is a most magnificent and graceful bird, perfectly domesticated, and breeding well in confinement, it would be a most valuable acquisition to the lakes and waters of our large city parks. I am unable to say much about the geese, as one enclosure contained several species together, and I probably should make mistakes in the names, not being ornithologist enough to name varieties I have never either seen or heard of before. However, I recognized our common Canada and white-fronted goose, and the brent, as old American acquaintances. The ruddy-headed goose from the Falkland islands, the China goose, said to be very common in Russia, and the Egyptian goose, which is furnished with a small, sharp spur on the bend or elbow of the wing, would no doubt prove valuable to our farmers if introduced into America, as they are perfectly domesticated. The male of the upland goose, (*Clæphaga magellanica*,) or upland goose from the Falkland Islands, is a very large and fine bird; but one of the prettiest geese in the collection is the Sandwich Islands goose, (*Clæphaga sandwichensis*,) which may be more properly classed among the land than the water birds. It was introduced into Europe in 1832. The red-billed tree duck, (*Dendrocygna antumnalis*.) from Guinea and Brazil, appeared to be quite domesticated, and when I saw it was feeding upon the short turfy grass in its enclosure in a very goose-like manner. It is a very ornamental bird, the bright red bill and legs forming a striking contrast to the shaded gray and black color of its plumage. The white-faced tree duck from Brazil, in the same paddock, is also one of the perching ducks, but is of a smaller size, with bluish bill and legs, and instead of the usual quack given by our tame duck, this bird makes a kind of whistling sound. Our common wood or summer duck is also domesticated here. This species of duck ought to be more highly prized by our countrymen than it now is, and most probably it would be were it a foreigner and cost a very large sum of money to import. In these gardens it is as tame as our domestic mallards, and reproduces with as little trouble. The mandarin ducks from the north of China were all in very plain plumage, but, when in full summer dress, the male is said to be the most beautiful bird of the duck tribe. It somewhat resembles our summer duck in size, shape, and color, but is said to be infinitely more beautiful. These ducks were introduced into Holland about 1850, and reproduce very readily in a state of domestication. The Bahama duck, *Anas* (*dafila*) *bahamensis*, is very easily domesticated, and resembles a small mallard with a pointed tail, but the bright red color on the base of its bill renders it a most beautiful object when swimming.

In the collection of the Zoological Society of London were some animals and water-fowl which were not in the gardens of acclimation in Paris, and which deserve a passing notice, as they may be introduced and acclimated in this country.

Among the swans, the black-neck swan (*Cygnus nigricollis*,) from Chili presented a remarkable appearance, the plumage of the body, wings, and tail being snow-white, while the head and neck are jet-black. The bill is ornamented with a red knob or protuberance. As they bred in England in 1858 and 1859, they may be considered as acclimated there.

The genus *Clæphaga*, as grass-eating geese, derive their name from their habit of feeding almost entirely upon grass, and are more terrestrial than aquatic in

heir habits. The ash-headed goose, *clœphaga poliocephala,* may be partic-arly noticed, as they have increased rapidly since their introduction in 1849. ι : Cereopsis goose (*Cereopsis novæ hollandiæ,*) or Cape Barren goose, from 8 tralia, breeds almost every year in the gardens. This bird is large and of a r color; its bill is very short, with the base of a yellow green tint; the legs e pinkish, and the feet dark. The bar-headed goose, (*Anser indicus,*) from ıindostan, is so called from the head, which is white, being barred with a black stripe running across it from the eyes, and another similar stripe below ; m. The red-breasted goose, *Bernicla ruficollis,* from northeastern Europe, ıd northern Asia, is very rare. The crown of the head is black with a white ch near the bill; on each cheek is a red patch bordered with white, and its ›ck at a distance appeared to be longitudinally striped with white and a dark ›olor.

The beautiful Bahama duck has been bred very freely in a state of semi-lomestication, and might be introduced here in our lakes and ornamental ponds.

Among the swine in the gardens of the Zoological Society of London may ; seen the West Indian river hog, *Palamochœrus penicillatus,* which is re-ırkable for large protuberances on each side of its face; its color is reddish yel- ‹ with a white line on the back, and a white stripe around the eyes and on › cheeks; its tail is long and straight, and the ears are upright, narrow, and ed with hair at the end.

ı white-whiskered pig, or Japanese wild swine, *Sus leucomystax,* resembles ›ur peccary. The young of the European wild boar are of a dirty brown color, ongitudinally striped with lines of a lighter color; these lines disappear with ıge. This fact is merely mentioned as the young of our semi-wild hogs in the ›outh are sometimes striped in a similar manner.

The Andaman pig appeared to be the most susceptible of domestication, as it was very quiet, and showed a tendency to fatten; indeed it looked very much ike a domesticated swine of the Chinese blood, and was of a blackish color, with erect short ears.

The wild sheep were represented by the Barbary sheep, *Ovis tragelaphus.* This animal approaches near the goat in many respects. The Punjaub wild ep, *Ovis cycloceros,* from northern India, and the European mouflon, *Ovis usimon,* from Corsica and Sardinia, have both bred in confinement.

These notes in regard to the gardens of acclimatization, and the animals and birds therein, have been more extended and minute in detail than might appear necessary; but it was thought that many of the observations here made would be useful in this country to founders of the new parks and public grounds now becoming so popular in all our large cities. Also, the facts here made known may be of interest to the Department of Agriculture, should it decide to institute similar establishment for breeding such useful animals and fowls as it might found desirable to introduce and acclimatize.

It may be further added, that at the exposition of insects I was an exhibitor well as an observer, having taken with me a colored copy of my insect plates, ı50 in number, to which I had attached a catalogue of the vegetable substances ed upon by insects. By the aid of these plates and the catalogue I was able o explain the idea upon which the entomological division of our national agri-cultural museum is based. The French had nothing like it at the Exposition, ınd to prove the estimation in which the work and the plan were held by them, have the honor to report to you that I received therefor the great gold medal of his Majesty the Emperor. Also, to this may be appended the following ex-tract, translated from the official report of the exhibition, page 115, of the "Doc-uments relating to the Exposition of Insects, held at the Palace of Industry, at Paris, in 1865:"

"The grand gold medal of the Emperor yet remained to be decreed, and the y sought to ascertain to whom the high award was due; when, at a late hour,

a stranger, an American, M. Townend Glover, attached to the Department of Agriculture, at Washington, presented himself with a work on practical entomology, applicable to agriculture; this work, comprising, on 130 copper plates, the useful and noxious insects of North America, belonging to all the orders established by naturalists, coleoptera, &c., is designed and executed by the exhibitor himself from nature, and presents them in their three forms of larva, pupa, and perfect insect.

"To these 130 plates is attached a table with numbers, which refer to the text, and indicate the plants, trees, or shrubs commonly inhabited by each larva or insect, mentioning the parts attacked, whether the roots, leaves, wood, fruits, grains, &c.; the nature of the damage done, the habits of the insects, the remedies, old and new, to prevent their ravages, and, as far as known, the efficacy of the remedies. These plates have been executed with the greatest care, the insects being represented with exact fidelity to nature. In brief, this work, which has cost the author ten years of research and observation, and for which he well merits the high position he occupies in the Department of Agriculture at Washington, was judged by an eminently scientific jury to be original in its style and character, and deserving to be copied by the entomologists of France as a *desideratum* in the application of their science to agriculture.

"This work, though not yet completed in the text, is remarkable for its plan. One division in it is especially full of interest to us; it is that which treats of the cotton plant, (now being cultivated in several of our provinces in Algeria,) with representations of the insects which attack the roots, the flower, and the capsule."

All of which is respectfully submitted.

TOWNEND GLOVER.

Hon. ISAAC NEWTON,
Commissioner of Agriculture.

RESOURCES AND INDUSTRIAL CONDITION OF THE SOUTHERN STATES.

BY DANIEL R. GOODLOE, OF NORTH CAROLINA.

THE SOCIAL AND POLITICAL REVOLUTION.

The attempt of the slaveholding States to throw off their allegiance to the Constitution of the Union has been properly designated a rebellion; while the failure of the effort has been attended by consequences which can only be characterized as a revolution, more complete and radical, as it affects themselves, than any of which history furnishes a record. This revolution is in every point of view unique. It was not intended or contemplated by the authors of the rebellion, but has resulted from their abortive enterprise. It is two-fold in its nature—political and social. The oligarchy which has so long ruled the country is, for the time being, stripped of all power, and its members are suing for pardon at the hands of the national Executive. As a powerful class, bound together by common interests, it is forever dissolved by the destruction of slavery. The passions which inspired it in the past will cling to the individuals composing it; but they must cease to have a great common bond of fellowship, and they can no longer be united in a common purpose.

But it is the radical and compulsory change in the social system which distinguishes the southern from all other revolutions, ancient and modern, and which has caused a temporary paralysis of industry.

The whole structure of southern society was founded on slavery. It was the one great controlling interest. The institution was a curse to the country. It

rded industry and enterprise by an unnecessary absorption of capital. It e all to agriculture, and left nothing for commerce and manufactures; but in actual condition of things, slaves constituted the most valuable property of southern people. Land was always dull of sale; town lots and other prop- were never in great demand; manufacturing and mechanical investments e rarely safe; but negro property was always available. Slaves were port- , and could be sold at a large profit by their transfer from the old and worn- plantations of Virginia and the Carolinas to the fertile cotton fields of the thwest. Generations had been educated in the employment of slave labor, h all its attendant circumstances; and the sudden destruction of the system duces a derangement and disorganization of industry not unlike that which ld follow an instantaneous transfer of the population of the city to the coun- or of the country to the city. The people must learn new methods of con- ting their farms and households, and must become habituated to the idea that ir late slaves are freemen, before the south can resume its former prosperity.

ATISTICS OF POPULATION, AREA, INTERNAL IMPROVEMENTS, AND WEALTH.

The great change which has taken place in the labor system of the south sents the opportunity for infusing new elements into southern life and new is of industrial enterprise. The desire for information in regard to the con- on and resources of the southern States has been greatly stimulated since overthrow of the rebellion and of slavery. The voluminous reports of the isus bureau, although abounding in such information, are not accessible to public at large; and the knowledge to be obtained from them is diffused over irge space, and through several quarto volumes. There are also other sources valuable facts in regard to the south, and it has been thought advisable to sent the whole subject in a single article through the pages of this report. ore entering into a review of the nature and characteristics of slavery as a tem of organized labor, and upon the consequences which result from its lition, the following tables and statistical statements are presented, in order t the reader may have, so to speak, the whole case before him. It will seen that the "border States" which remained in allegiance to the Union are inguished, as far as was practicable, from those which engaged in the ellion. The tables here presented are deduced from the census, but not hout considerable labor. It has been of late years the practice with the ipilers of the census returns to place the statistics of the several States alphabetical order, thus confounding the slaveholding with the non-slaveh ld-. The inconveniences of this arrangement have often been experienced by ters and speakers, as well as by the students of American statistics. It has been without considerable labor that I have rearranged them in the order in ch they stand in this article, which shows at a glance the relative wealth, ulation, and resources of the south as compared with those of the north.

Territorial extent and population to the square mile.

BORDER STATES AND DISTRICT OF COLUMBIA.

States.	Square miles.	No. of acres.	Population to square mile.
rict of Columbia	60	38,400	1,251.00
iware	2,120	1,356,800	52.93
yland	11,124	7,119,360	73.43
t Virginia	20,541	13,146,240	17.00
tucky	37,680	24,115,200	30.67
iouri	67,380	43,123,200	17.54
Total	138,905	88,899,200	25.64

STATES LATELY IN REBELLION.

States.	Square miles.	No. of acres.	Population to square mile.
Virginia	40,811	26,119,040	30.54
North Carolina	50,704	32,450,560	19.58
South Carolina	29,385	18,806,400	23.93
Georgia	58,000	37,120,000	18.23
Florida	59,269	37,931,250	2.37
Alabama	50,722	32,462,080	19.01
Mississippi	47,156	30,179,840	16.78
Louisiana	46,431	29,715,840	15.25
Texas	237,504	152,002,560	2.55
Arkansas	52,198	33,406,720	8.34
Tennessee	45,600	29,184,000	24.34
Total	717,780	459,378,290	12.19
Add border States	138,905	88,899,200	25.64
Grand totals	856,685	548,277,490	14.37

Population of the southern States and District of Columbia in 1860.

BORDER STATES.

States.	Whites.	Free colored.	Slaves.	Total.
Delaware	90,589	19,829	1,798	112,216
Maryland	515,918	83,942	87,189	687,049
District of Columbia	60,764	11,131	3,185	75,080
*West Virginia	334,891	1,976	12,761	349,628
Kentucky	919,517	10,684	225,483	1,155,684
Missouri	1,063,509	3,572	114,931	1,182,012
Total	2,985,188	131,134	445,347	3,561,669

* The addition of Berkeley and Jefferson counties will add 27,060 to the total population.

REBELLIOUS STATES.

States.	Whites.	Free colored.	Slaves.	Total.
Virginia	712,520	56,066	478,104	1,246,690
North Carolina	631,100	30,463	331,059	992,622
South Carolina	291,388	9,914	402,406	703,708
Georgia	591,588	3,500	462,198	1,057,286
Florida	77,748	932	61,745	140,425
Alabama	526,431	2,690	435,080	964,201
Mississippi	353,901	773	436,631	791,305
Louisiana	357,629	18,647	331,726	708,002
Texas	421,294	355	182,566	604,215
Tennessee	826,782	7,300	275,719	1,109,801
Arkansas	324,191	144	111,115	435,450
Total	5,114,572	130,784	3,508,349	8,753,705
Total border States	2,985,188	131,134	445,347	3,561,669
Grand total	8,099,760	261,918	3,953,696	12,315,374

The following statistics, compiled chiefly from the census, will further set forth the wealth and resources of the south :

Assessed value of real and personal property.

Years.	Real estate.	Personal estate.	Total.	Estimated or true value.
DISTRICT OF COLUMBIA.				
....	$14,409,413	$1,774,342	$16,183,755	....
....	23,097,542	7,987,403	41,084,945	....
DELAWARE.				
1850	14,486,595	4,410,275	18,896,870	$21,062,556
1860	26,273,803	13,493,430	39,767,233	46,242,181
MARYLAND.				
1850	139,026,610	69,536,956	208,563,566	219,217,364
1860	231,793,800	65,341,438	297,135,238	376,919,944
WEST VIRGINIA.*				
KENTUCKY.				
1860	277,925,054	250,287,639	528,212,693	666,043,112
MISSOURI.				
1860	253,450,577	113,485,274	366,935,851	501,214,398
REBELLIOUS STATES.				
VIRGINIA.†				
1860	417,952,228	239,069,108	657,021,336	793,249,681
NORTH CAROLINA.				
1860	116,366,573	175,931,029	292,297,602	358,739,399
SOUTH CAROLINA.				
1860	129,772,684	359,546,444	489,319,128	548,138,754
GEORGIA.				
1860	179,801,441	438,430,946	618,232,387	645,895,237
FLORIDA.				
1860	21,722,810	47,206,875	68,929,685	73,101,500
ALABAMA.				
1860	155,034,089	277,164,673	432,198,762	495,237,078
MISSISSIPPI.				
1860	157,836,737	351,636,175	509,427,912	607,324,911
LOUISIANA.				
1860	280,704,988	155,082,277	435,787,265	602,118,568
TENNESSEE.				
1860	219,991,180	162,504,020	382,495,200	493,903,892
ARKANSAS.				
1860	63,254,740	116,956,590	180,211,330	219,256,473
TEXAS.				
1860	112,476,013	155,316,322	267,792,335	365,200,614

*In the census returns the value of real and personal estate is given in the aggregate for each State, and it is therefore impracticable to distinguish between East and West Virginia in this respect. The valuation of property for the State, as it existed in 1860, is stated in its proper place.

†For the reason stated above, the valuations include those of West Virginia.

CANALS, RAILWAYS, ETC.

The following table exhibits the number of miles of railroads in each of the southern States, the number of miles of canal, and the number of miles of slack-water navigation. The District of Columbia, as elsewhere in this article, is classed with the border States, for the reason that it was formerly a part of them, and constituted a portion of the south.

BORDER STATES.

States	Canals, miles of.	Railroads, miles of.	Slack-water navigation, miles of.
District of Columbia	8	6	....
Delaware	12.63	136.69	....
Maryland	184.50	380.30	....
*West Virginia	....	....	....
Kentucky	2.50	569.93	766
Missouri	....	817.45	....
Total	207.63	1,910.37	766

* For the reason already explained, the statistics of East and West Virginia are blended.

REBELLIOUS STATES.

States.	Canals, miles of.	Railroads, miles of	Slack-water navigation, miles of.
Virginia	196.98	1,771.16	....
North Carolina	19	889.42	....
South Carolina	51.32	987.97	....
Georgia	28	1,404.22	....
Florida	....	401.50	....
Alabama	51.76	743.16	....
Mississippi	....	872.30	....
Louisiana	4.25	334.75	63
Tennessee	....	1,197.92	....
Arkansas	....	38.50	....
Texas	....	306.00	....
Total	351.31	8,946.90	63
Border States	207.63	1,910.37	766
Grand total	558.94	10,857.27	829

The whole number of miles of canals in the United States in 1860 was 4,215.34, of which, as will be seen, the southern States (both loyal and disloyal) contained 558.94, or less than one-seventh. The whole number of miles of railroads in the Union at the same period was 30,793.67, of which the late slaveholding States contained, as above, 10,857.27, or a fraction more than one-third. This is exclusive of city passenger railways drawn by horses, of which there were 402.57 miles, which, with the exception of 26.30 miles in St. Louis, were in the cities of the non-slaveholding States. The whole number of miles of slack-water navigation in 1860 was 1,246.77, of which 829 miles, or two-thirds, were in the slaveholding States, chiefly in Kentucky.

SOIL, CLIMATE, AND PRODUCTION.

The southern States, extending from the 40th to the 24th degree of north itude, and from the 75th to the 107th degree of west longitude, embrace a eat variety of climate, and every variety of soil. Their productions include ose of the temperate and tropical zones. The south produces all the cereals; it its soil and climate are best adapted to Indian corn, wheat, oats and rice. he latter grain is produced exclusively in the lowlands of the Carolinas, Georgia, d the Gulf States. The great staple, cotton, is also produced almost exclu-rely in the south. The crop of 1859, the last reported in the census, amounted 5,335,354 bales, of 400 pounds each, clear of the seed; or to (2,154,141,600) ro billion one hundred and fifty-four million one hundred and forty-one thou-nd six hundred pounds. This crop would now (March, 1866) be worth at irrent prices about $900,000,000, a sum equal to nearly one-third of the itional debt. The south has no equal in the production of cotton, which is incom-ably the greatest item in the commerce of nations, and is destined to confer on this country, in connexion with the gold and silver products, the command the commerce of the world. Next in importance to cotton, among southern ex-rts, is tobacco. This, like cotton, rice, and cane-sugar, is peculiarly though it exclusively a southern production. The following statistics, culled from the nsus, embrace the leading articles of southern production. It is proper to y, however, that every article which grows in any northern State, will flourish, ider proper culture, in every southern State.

It is an interesting fact that the south produced more of the great staple, Indian rn, than the north. Thus the aggregate crop of the Union in 1859 was 38,792,740 bushels, of which the southern share was 441,980,667 bushels. Illi-is produced more than any other one State, and next in order came Ohio, issouri, Indiana, Kentucky, and Tennessee.

The south produced about two-sevenths of the wheat crop, and nearly a fifth the oat crop. It produced about one-ninth of the common potato crop, and arly all of the sweet potatoes. Hay is grown in the south, especially in the untain districts, and in Missouri and Kentucky. But this great crop is pecu-ly northern.

There are many other valuable agricultural productions not here enumerated. is sufficient to repeat that whatever grows in the northern States will, under an lightened system of husbandry, flourish in all parts of the south.

incipal productions of the southern States as reported in the census of 1860.

States.	Tobacco.	Cane-sugar.	Hemp.	Peas and beans.	Cotton.
	Pounds.	*Hhds.*	*Tons.*	*Bushels.*	*Bales of 400 lbs.*
bama	232,914	175		1,482,036	989,955
ansas	989,980		447	440,472	367,393
laware	9,699			7,438	
rida	828,815	1,669	1	363,217	65,153
orgia	919,318	1,166	31	1,765,214	701,840
ntucky	108,126,840		39,409	283,346	
uisiana	39,940	221,726	1	431,148	777,738
ryland	38,410,965		272	34,407	
sissippi	159,141	506		1,954,666	1,202,507
souri	25,086,196	402	19,267	107,999	41,188
th Carolina	32,853,250	38	3,016	1,932,204	145,514
th Carolina	104,412	198	1	1,728,074	353,412
nnessee	43,448,097	2	2,243	547,803	296,464
as	97,914	5,099	179	341,961	431,463
ginia	123,968,312		15	515,168	12,727
t. of Columbia	15,200			3,749	
Total	375,290,993	230,981	64,882	11,943,902	5,385,354

The total tobacco crop of the Union in 1860 was 434,209,461 poun the southern States, therefore, produced seven-eighths of the whole.

The cane-sugar crop was all produced in the south.

The hemp crop of the country was 74,493 tons, of which the south pr six-sevenths.

The pea and bean crops amounted to 15,061,995 bushels, four-fifths of grew in the south.

The cotton crop was entirely southern, except 1,482 bales grown in Ill

LIVE STOCK.

Live stock in the southern States in 1860.

States.	Horses.	Asses and mules.	Milch cows.	Working oxen.	Oth
Alabama	127,063	111,687	230,537	88,316	
Arkansas	140,198	57,358	171,003	78,707	
Delaware	16,562	2,294	22,595	9,530	
Florida	13,446	10,910	92,974	7,361	
Georgia	130,771	101,069	299,688	74,487	
Kentucky	355,704	117,634	269,215	108,999	
Louisiana	78,703	91,762	129,662	60,358	
Maryland	93,406	9,829	99,463	34,524	
Mississippi	117,571	110,723	207,646	105,603	
Missouri	361,874	80,941	345,243	166,588	
North Carolina	150,661	51,388	228,623	48,511	
South Carolina	81,125	56,456	163,938	22,629	
Tennessee	290,882	126,345	249,514	102,158	
Texas	325,698	63,334	601,540	172,492	2
Virginia	287,579	41,015	330,713	97,872	
Dist. of Columbia	641	122	639	69	
Total	2,571,884	1,032,867	3,442,993	1,178,204	8

States.	Sheep.	Swine.	Value st
Alabama	370,156	1,748,321	$43,
Arkansas	202,753	1,171,630	22,
Delaware	18,857	47,848	3,
Florida	30,158	271,742	5,
Georgia	512,618	2,036,116	38
Kentucky	938,990	2,330,595	61
Louisiana	181,253	634,525	24
Maryland	155,765	387,756	14
Mississippi	352,632	1,532,768	41
Missouri	937,445	2,354,425	53
North Carolina	546,749	1,883,214	31
South Carolina	233,509	965,779	23
Tennessee	773,317	2,347,321	60
Texas	753,363	1,371,532	42,
Virginia	1,043,269	1,599,919	47,
District of Columbia	40	1,099	
Total	7,050,874	20,684,590	515,

The following statements exhibit the number and value of the live stock in the whole Union, in 1860, in comparison with that of the southern States:

	Horses.	Asses and mules.	Milch cows.	Working oxen.	Other cattle.
United States	6,249,174	1,151,148	8,581,735	2,254,911	14,779,373
Southern States	2,571,884	1,032,867	3,442,993	1,178,204	8,223,120
Northern States	3,677,290	118,281	5,138,742	1,076,707	6,556,253

	Sheep.	Swine.	Value of live stock.
United States	22,471,275	33,512,867	$1,089,329,915
Southern States	7,050,874	20,684,590	515,262,710
Northern States	15,420,401	12,828,277	574,067,205

It will be seen that the southern States possessed more asses and mules, more cattle, and more swine in 1860 than the northern; and that the value of live stock in the south was greater, according to the estimates of the census-takers. This latter fact will strike most minds with surprise, and, in view of the general ...ority of northern animals, it can scarcely be credited. As it regards the greater numbers of southern live stock, however, there can be no doubt, and the fact is one of great interest, as illustrative of the resources of that section. The butter crop of the northern States excels that of the south in the proportion of five to one, while the cheese crop of the country, amounting to 103,663,927 pounds, is almost entirely northern.

MANUFACTURES.

The following table exhibits the total of manufactures in each of the southern States for the year ending June 1, 1860.

States and District of Columbia.	Number of establishments.	Capital invested.	Cost of raw material.	Number of hands employed. Male.	Female.	Annual cost of labor.	Annual value of products.
...ma	1,459	$9,098,181	$5,489,963	6,792	1,027	$2,132,940	$10,588,566
...sas	518	1,316,610	1,280,503	1,831	46	554,240	2,880,578
...are	615	5,452,887	6,028,918	5,465	956	1,995,754	9,892,902
Florida	185	1,874,125	874,506	2,297	157	619,840	2,447,969
Georgia	1,890	10,890,875	9,986,532	9,492	2,083	2,925,148	16,925,564
Kentucky	3,450	20,256,579	22,295,759	19,587	1,671	6,039,082	37,931,240
Louisiana	1,744	7,151,172	6,738,486	7,873	916	3,683,679	15,587,473
Maryland	3,083	23,230,608	25,494,007	21,630	6,773	7,190,672	41,735,157
Mississippi	976	4,384,492	3,146,636	4,572	203	1,618,320	6,590,687
Missouri	3,157	20,034,220	23,849,941	18,628	1,053	6,669,916	41,782,731
North Carolina	3,689	9,693,703	10,203,228	12,104	2,113	2,689,441	16,678,698
South Carolina	1,230	6,931,756	5,198,881	6,096	898	1,380,027	8,615,195
Tennessee	2,572	14,426,261	9,416,514	11,582	946	3,370,687	17,987,225
Texas	983	3,272,450	3,367,372	3,338	111	1,162,756	6,577,202
Virginia	5,385	26,935,560	30,840,531	32,606	3,568	8,514,117	50,652,124
Dist. of Columbia	429	2,905,865	2,884,185	2,653	495	1,139,154	5,412,102
Total	31,365	167,855,344	167,085,962	166,546	23,086	51,606,773	292,285,413

The following statement exhibits the manufactures in the United States and Territories in comparison with those of the south:

	Number of establishments.	Capital invested.	Cost of raw material.	Number of hands employed.		Annual cost of labor.	Annual value of products.
				Males.	Females.		
Whole Union ..	140,433	$1,009,855,715	$1,031,605,092	1,040,349	270,897	$378,878,966	$1,885,861,676
South..........	31,365	167,855,344	167,085,962	166,546	23,086	51,606,773	292,285,413
North..........	109,068	842,000,371	864,519,130	873,803	247,811	327,272,193	1,593,576,263

It is seen that the southern share of capital invested in manufactures constitutes one-sixth of the whole. Compared with the western States, Indiana, Illinois, Michigan, Wisconsin, Iowa, and Kansas, the former slave States are not so far in the rear as is generally imagined. Illinois, for instance, with a population of 1,711,951 inhabitants in 1860, had a capital of $27,548,563 invested in manufactures. Virginia, with a population of 1,596,318 inhabitants, 490,865 of whom were slaves, and 58,042 free negroes, had a capital of $26,935,560 invested in manufactures. Kentucky and Missouri, also, had made larger investments in manufactures in proportion to population than either Illinois, Indiana, Wisconsin, or Iowa. On the other hand, each of the States of Pennsylvania and New York had invested more capital in manufactures than the fifteen southern States. The capital thus employed by the former in 1860 was $190,055,904, and that of the latter amounted to $172,895,652. Massachusetts, with a territory not larger than a Carolina congressional district, had invested in manufactures $132,792,327. The aggregate investment of the New England States was $257,477,783.

It is to be remarked that the manufacturing of the southern and western States consists in larger degree than that of the northeastern States in the mere preparation of the raw materials of agriculture for market. The same is, to some extent, true of the manufactures of Pennsylvania and New York, which embrace the extensive mining operations of the former, and the flour and meal manufactures of the latter. It is also worthy of notice that the manufactures of the southern States are, for the most part, located on their northern borders, where free labor has been predominant. Thus, in Delaware, of the $5,452,887 invested in manufactures, $4,863,472, or eight-ninths, belong to New Castle county, which contained but 254 slaves in a total population of 54,793. Maryland has $23,230,608 of manufacturing capital, nineteen-twentieths of which is to be found in the counties bordering on Mason's and Dixon's line, in which slavery had little more than a nominal existence. The manufacturing investments of Kentucky are chiefly at Louisville, and other places on the Ohio river; and three-fifths of the manufactures of Missouri are located at St. Louis. Wherever slavery is predominant, there no interest can flourish except agriculture.

SIZE OF FARMS.

ative of the agricultural and social condition of the south, the foll owing the number of farms of various sizes, will be interesting

Farms containing three acres and more.

s.	Acres, 3 and under 10.	Acres, 10 and under 20.	Acres, 20 and under 50.	Acres, 50 and under 100.	Acres, 100 and under 500.	Acres, 500 and under 1,000.	Acres, 1,000 and
....	1,409	4,379	16,049	12,060	13,455	2,016	
....	1,823	6,075	13,728	6,957	4,231	307	
....	63	215	1,226	2,208	2,862	14	..
....	430	945	2,139	1,162	1,432	211	
....	906	2,803	13,644	14,129	18,821	2,692	
....	1,772	6,868	25,547	24,163	24,095	1,078	
....	626	2,222	4,882	3,064	4,955	1,161	
l............	457	1,210	4,346	6,825	12,068	303	
pi	563	2,516	10,967	9,204	11,408	1,868	
....	2,428	9,110	33,620	24,336	18,497	466	
rolina	2,050	4,879	20,882	18,496	19,220	1,184	
rolina	352	1,219	6,695	6,980	11,369	1.359	
e............	1,687	7,245	22,998	22,829	21,903	921	
....	1,832	6,156	14,132	7,857	6,831	468	
....	2,351	5,565	19,584	21,145	34,300	2,882	
of Columbia .	25	36	71	42	57	2	
tal	18,774	61,443	210,510	181,457	205,504	16,932	4

following tables, showing the average number of acres to each farm i tes of the Union, at the same time marks the difference between the re States, in this particular:

States.	Average number of acres to each farm.		Slave States.	Average number of ac to each farm.	
	1850.	1860.		1850.	1860
a	4,466	466	Alabama.......	289	
icut	106	99	Arkansas	146	
....	158	146	Delaware	158	
....	138	124	Florida	371	
....	185	165	Georgia........	444	
....	....	171	Kentucky......	227	
....	97	103	Louisiana......	372	
usetts ...	99	94	Maryland	212	
a	129	113	Mississippi.....	309	
ta	184	149	Missouri	179	
mpshire..	116	123	North Carolina .	369	
sey......	115	108	South Carolina .	541	
k	113	106	Tennessee......	261	
....	125	114	Texas	942	
....	372	355	Virginia	339	
vania	117	109			
sland....	103	96			
....	139	135			
in.......	148	114			

The reader will see at a glance that the average size of the southern farm is greater than those of the north. It is also to be remarked that in all the fr States, except Maine and New Hampshire, the farms were smaller in 1860 tha in 1850. This is a healthy tendency, as it implies better husbandry and wider subdivision of the soil among the people. In the older southern State comprising a majority of the whole, the same law is observable; while in Gulf States, and in Arkansas and Missouri, the contrary is the case. As a g eral rule, where slavery was on the increase, the tendency was to the enlarg ment of the farms; while with the real or comparative diminution in the ber of slaves, the farms were reduced in size.

The enormous magnitude of the farms in California, in 1850, is explained b the fact that the early settlers engaged extensively in sheep-raising before muc attention was given to the cultivation of the earth; and the high average whic still existed in 1860, notwithstanding the extensive introduction of agricultur is doubtless owing to the continued existence of the same extensive grazir farms. The large averages in Texas and Oregon, in 1850; and their reductic in 1860, are to be accounted for in a similar way—cattle-raising in the latt cases being substituted for sheep-raising in California. If planting had b the chief occupation of the people, there can be no doubt that Texas, like t other new States of the southwest, would have exhibited an increase in tl size of farms between the years 1850 and 1860.

The following tables tend to explain the foregoing, by showing the proclivi of the slaveholders to buy more land than they could cultivate:

SLAVE STATES.

States.	Number of farms.		Acres of land improved.		Acres of land unimprove	
	1850.	1860.	1850.	1860.	1850.	1860.
Alabama	41,964	55,128	4,435,614	6,385,724	7,702,667	12,718,
Arkansas	17,758	39 004	781,530	1,983,313	1,816,684	7,590,
Delaware	6,063	6,658	580,862	637,065	375,282	367,
Florida	4,304	6,568	349,049	654,213	1,246,240	2,266,
Georgia	51,759	62,003	6,378,479	8,062,758	16,442,900	18,587,
Kentucky	74,777	90,814	5,968,270	7,644,208	10,981,478	11,519,
Louisiana	13,422	17,328	1,590,025	2,707,108	3,999,018	6,591,
Maryland	21,860	25,494	2,797,905	3,002,267	1,836,445	1,833,
Mississippi	33,960	42,840	3,444,358	5,065,755	7,046,061	10,773,
Missouri	54,458	92,792	2,938,425	6,246,871	6,794,245	13,737,
North Carolina	56,963	75,203	5,453,975	6,517,284	15,543,008	17,245,
South Carolina	29,967	33,171	4,072,551	4,572,060	12,145,049	11,623,
Tennessee	72,735	82,368	5,175,173	6,795,337	13,808,849	13,873,
Texas	12,198	42,891	643,976	2,650,781	10,852,363	22,693,
Virginia	77,013	92,605	10,360,135	11,437,821	15,792,176	19,679,
Totals	569,201	764,867	54,970,327	74,362,565	126,381,865	171,101,

It will be seen that in all the new States where there was public land to had, the increase in the quantity of "unimproved" is, having reference to t number of farmers, out of all proportion to the addition of "improved" land.

FREE STATES.

States.	Number of farms.		Acres of land improved.		Acres of land unimproved.	
	1850.	1860.	1850.	1860.	1850.	1860.
California	872	18,716	32,454	2,468,034	3,861,531	6,262,000
Connecticut	22,445	25,180	1,768,178	1,830,807	615,701	673,457
Illinois	76,208	143,310	5,039,545	13,096,374	6,997,867	7,815,615
Indiana	93,896	131,826	5,046,543	8,242,183	7,746,879	8,146,109
Iowa	14,805	61,163	824,682	3,792,792	1,911,382	6,277,115
Kansas	....	10,400	....	405,468	....	1,372,932
Maine	46,760	55,698	2,039,596	2,704,133	2,515,797	3,023,538
Massachusetts	34,069	35,601	2,133,436	2,155,512	1,222,576	1,183,212
Michigan	34,089	62,422	1,929,110	3,476,296	2,454,780	3,554,538
Minnesota	157	18,181	5,035	556,250	23,846	2,155,718
New Hampshire	29,229	30,501	2,251,488	2,367,034	1,140,926	1,377,591
New Jersey	23,905	27,646	1,767,991	1,944,441	984,955	1,039,084
New York	170,621	196,990	12,408,964	14,358,403	6,710,120	6,616,555
Ohio	143,807	179,889	9,851,493	12,625,394	8,146,000	7,846,747
Oregon	1,164	5,806	132,857	896,414	299,951	1,164,125
Pennsylvania	127,577	156,357	8,628,619	10,463,296	6,294,728	6,548,844
Rhode Island	5,385	5,406	356,487	335,128	197,451	186,096
Vermont	29,763	31,556	2,601,409	2,823,157	1,524,413	1,451,257
Wisconsin	20,177	69,270	1,045,499	3,746,167	1,931,159	4,147,420
Totals	874,929	1,265,918	57,858,386	88,287,283	54,580,062	70,841,953

In order to make the comparisons palpable the following summary of the above tables is presented:

States.	Number of farms.		Acres of land improved.		Acres of land unimproved.	
	1850.	1860.	1850.	1860.	1850.	1860.
Northern	874,929	1,265,918	57,858,386	88,287,283	54,580,062	70,841,953
Southern	569,201	764,867	54,970,327	74,362,565	126,381,865	171,101,718
Differences	305,728	501,051	2,888,059	13,924,718	71,801,803	100,259,765

The reader will remark that, both in the number of farms and in the number of acres of improved land at each of the periods, the northern States are largely in the ascendant. Also, that the ratio of increase in both these respects is generally on the side of the north. But in the columns containing the number of acres of unimproved lands the reverse is true. In 1850 the unimproved land appertaining to the southern farms was two and one-third times greater in quantity than similar lands belonging to the northern farms; and in 1860 the disparity was still greater. These facts illustrate the tendency of slavery to exhaust the soil by unskilful husbandry, and thus to make necessary new acquisitions. A large proportion of the "unimproved" lands in the south are, in fact, worn out fields which have been abandoned, as commons. This is particularly true of Virginia, the Carolinas, and Georgia

A careful examination of the above tables will demonstrate that the smaller proportion of "unimproved" land belonging to northern farms, compared with those of the south, cannot be explained by the existence of a larger population in the one section than the other. For if States like Georgia, Alabama, Mississippi, Louisiana, and Arkansas, be compared with the States of the northwest, Illinois, Indiana, Michigan, Wisconsin, Iowa, and Minnesota, where land is equally abundant, the same characteristic difference will be found to exist; and it can alone be accounted for by the presence of slavery in one section, and its absence from the other.

EFFECTS OF SLAVERY ON POPULATION.

The foregoing facts suggest further inquiry into the nature of slavery, as system of organized labor. It is apparent that the institution tends to retan the growth of population by immigration, if it has not the same effect upon th natural increase; that it obstructs the accumulation of wealth, and is especiall incompatible with the development of commercial and manufacturing ind y The following tables, showing the populations, respectively, of the free slave States, in 1790 and 1860, with their ratios of increase between tl periods, are full of instruction on these points.

Population of free States in 1790 *and* 1860, *with the ratio of increase, in tenths and hundredths.*

States.	1790.	1860.	Ratio of increase.	Settled-
California	....	....	....	....
Connecticut	238,141	460,147	93.22	....
Illinois	....	1,711,951	13.838.70	1810.
Indiana	....	1,350,428	27.601.09	1800.
Iowa	....	674,913	1.465.56	1840.
Kansas	....	....	....	....
Maine	96,540	628,279	550.80	....
Massachusetts	378,717	1,231,066	225.06	....
Michigan	....	749,113	15.631.06	1810.
Minnesota	....	172,023	2.730.72	1850.
New Hampshire	141,899	326,073	129.79	....
New Jersey	184,139	672,035	264.96	....
New York	340,120	3,880,735	1.040.99	....
Ohio	....	2,339,511	5.057.08	1800.
Oregon	....	52,465	294.65	1850.
Pennsylvania	434,373	2,906,215	569.03	....
Rhode Island	69,110	174,620	152.67	....
Vermont	85,416	315,098	268.90	....
Wisconsin	....	775,881	1.994.42	1840.
Total	1,968,455	18,420,553	935.78	....

Population of slave States in 1790 *and* 1860, *with the ratio of increase.*

States.	1790.	1860.	Ratio of increase.	Ratio calcu from cens
Alabama	....	964,201	653.87	1820.
Arkansas	....	435,450	2.950.87	1820.
Delaware	59,096	112,216	89.88	....
Florida	....	140,424	304.33	1830.
Georgia	82,548	1,057,286	1.180.81	....
Kentucky	73,077	1,155,684	1.481.46	....
Louisiana	319,728	708,002	824.82	1810.
Maryland	....	687,049	114.88	....
Mississippi	....	791,305	6.841.30	1800.
Missouri	....	1,182,012	5.570.48	1810.
North Carolina	393,751	992,622	152.09	....
South Carolina	249,073	703,708	182.53	....
Tennessee	35,795	1,109,801	3.000.78	....
Texas	....	604,215	184.22	1850.
Virginia	748,308	1,596,318	113.32	....
Total	1,961,372	12,240,293	624.06	....

COMMERCE.

ollowing tables, showing the trade between Great Britain and her American from 1697 to 1775, are taken from Hazard's Commercial Register. monstrate the superior natural advantages of the southern over the colonies as producers of articles which command a price in European But it is a great folly to suppose or pretend that they denote a superior ' commerce on the part of the south at that period. The fact is, that hern colonies had no shipping worth speaking of, while that of the s distinguished in that particular.

NORTHERN COLONIES.

ars.	New England exports.	New England imports.	New York exports.	New York imports.	Pennsylvania exports.	Pennsylvania imports.
....	£26,282	£68,468	£10,093	£4,579	£3,347	£2,997
....	38,793	120,631	14,283	29,285	786	14,365
....	58,898	132,001	24,534	44,140	4,499	22,505
....	75,052	187,227	31,617	67,452	12,823	31,979
....	63,347	223,923	16,833	125,838	15,198	56,690
....	41,771	210,640	14,992	137,984	3,832	82,404
....	27,556	363,404	19,168	353,311	14,190	168,426
....	128,207	406,081	61,422	417,957	37,641	371,830
....	116,588	71,625	187,018	1,228	175,962	1,366

bles in Hazard's work, from which the foregoing figures are taken lete for the entire series of years; but these extracts will convey a y accurate idea of the whole.

llowing is made up in like manner from the complete tables of Hazard:

SOUTHERN COLONIES.

ars.	Virginia and Maryland exports.	Virginia and Maryland imports.	Carolina exports.	Carolina imports.	Georgia exports.	Georgia imports.
....	£227,756	£58,796	£12,374	£5,289	....	....
....	207,625	237,901	23,311	10,492	....	....
....	296,884	215,962	41,275	25,058	....	....
....	421,588	192,965	96,055	23,254	....	....
....	492,246	211,301	187,758	58,986	....	£5,701
....	492,619	200,088	107,500	95,529	....	24
....	418,881	426,667	130,889	213,949	....	2,571
....	437,926	437,628	395,027	244,093	£35,856	23,334
....	758,356	1,921	579,349	6,245	103,477	113,777

ader will remark that the exports and imports of the southern colonies . those of the northern during the greater part of the long period em- the tables. The following figures from Hazard's work, showing the owned by the States north and south during the first thirty years Constitution, will leave no doubt of the fact already stated, that the e of the southern colonies was carried on by the mother country, or by thern neighbors.

NORTHERN STATES.

Years.	Massachusetts.	N. Hampshire.	Connecticut.	Rhode Island.	New York.	New Jersey.	Per va
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*T*
1791......	95,000	10,496	18,140	17,003	41,866	1,171	
1800......	223,000	14,120	31,260	18,841	97,791	806	
1810......	352,000	24,534	22,671	28,574	188,566	17,336	1

SOUTHERN STATES.

Years.	Delaware.	Maryland.	Virginia.	North Carolina.	South Carolina.	Ge
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*T*
1791...............	4,283	34,492	33,239	23,248	23,856	
1800...............	2,066	81,446	41,838	20,949	43,731	
1810...............	1,242	90,045	45,339	26,472	43,354	

This remarkable disparity between northern and southern shipping, has been growing wider and wider ever since, like the disparity in manufac enterprise, demonstrates the essentially colonial character of countries in slavery prevails. The south has always produced the articles most in in foreign markets, and yet it has never had anything deserving the na commerce. Its great staple furnishes the most important item of Europea northern commerce and manufacture, while next to none of it is manufa on the soil which produces it, and as small a proportion is shipped abr southern ships.

The following tables are taken from the report of the Secretary of the T on commerce and navigation for the year 1860, and will further illustrate this

Statement exhibiting the commerce of each of the slave States for the fisca ending June 30, 1860.

Slave States.	VALUE OF EXPORTS.		VALUE OF TOTAL EXPORTS.	Value po
	American produce.	Foreign produce.	American and foreign.	
Delaware..................	$87,426	....	$87,426	
Maryland..................	8,804,606	$196,994	9,001,600	9,7
District of Columbia..........	4,413	....	4,413	
Virginia..................	5,833,371	24,653	5,858,024	1,3
North Carolina..............	760,094	....	760,094	3
South Carolina..............	21,193,723	11,614	21,205,337	1,5
Georgia..................	18,483,038	....	18,483,038	7
Alabama..................	38,670,183	....	38,670,183	1,0
Florida..................	1,299,852	30,378	1,330,230	3
Louisiana..................	107,812,580	605,218	108,417,798	22,9
Texas..................	5,856,934	927,000	6,783,934	2,
Totals..............	208,806,220	1,795,857	210,602,077	40,5
Total commerce of the U. States.	373,189,274	26,933,022	400,122,296	362,1
Deduct southern commerce.....	208,806,220	1,795,857	210,602,077	40,5
Northern commerce..........	164,383,054	25,137,165	189,520,219	321,

een that a majority of the domestic exports was sent out from the States, while nine-tenths of the foreign goods exported or reshipped t out from northern ports.

orts, the share of the south was as 40 to 321, or about one-ninth of the This fact shows that a very small portion of southern commerce was ern hands. The cotton, tobacco, and other raw products were neces- ipped from the nearest southern ports, but the ships belonged to north- reign merchants. No better evidence could be desired of the unmer- haracter of the southern people than is furnished by this table. A peo- the slighest genius for commerce would, on the basis of such vast ex- ort for the whole country; and the great mass of trade, instead of to the north, ought to be at Norfolk, Charleston, Savannah, Mobile, Orleans; but the maintenance of slavery doomed the south to a co- ndition, and it is as idle to talk of the commerce of the slaveholding of that of the West India islands. Like those islands, the south has great producer of the objects of commerce; but the commerce has at b in other hands.

is more fully demonstrated by the following table from the same port:

ment of the tonnage of the several slave States on June 30, 1860.

	Tons and 95ths.
	23, 953.37
l	255, 037.19
of Columbia	45, 230.88
	92, 812.12
rolina	47, 964.83
rolina	66, 741.23
	43, 526.63
	28, 800.50
	52, 757.72
pi	3, 737.33
	234, 988.66
e	12, 364.02
	36, 801.84
	64, 683.66
	12, 842.74
	1, 022, 242.72
nage of the United States	5, 353, 868.42
outhern tonnage	1, 022, 242.72
northern tonnage	4, 331, 625.70

south, while producing a majority of the exports, owned less than a shipping of the Union, and brought to the country only one-ninth orts. The shipping was in two-fold greater proportion than the ce of the south, which shows that the vessels owned by it were ers or river steamers. This also appears from the report of the r, which places a majority of southern tonnage under the head "En- "

OF FREE AND SLAVE LABOR.

It is a singular fact that the institution of slavery, which has been tl absorbing topic of discussion among politicians and moralists in two hemi: during the greater part of the present century, has awakened so little among political economists. Of the hundreds of treatises on that science the age has produced, there is, perhaps, not one which has devoted to more than a brief chapter, in which, with rare unanimity, none but th obvious evils of the system are pointed out. No attempt has been made class of authors to analyze and define the functions of capital invested in s nor to show that there exists any difference between this and other mode vestment. Yet this is the great economical problem, aside from which involves only a question of conscience and morals. Although slavery h destroyed in this country, and there remains not a shadow of reason to hend that it can ever be revived, this problem is eminently worthy of s If it can be demonstrated that the whole capital invested in slaves was to the south as an agency of production, the southern people, if they ceive the truth, will the more readily acquiesce in what seems to have providential dispensation. Their prejudices and passions may continue t them to the moral wrong of slavery, but they may yield to the convictic the institution is inconsistent and at war with the eternal laws of p economy. If they can be clearly convinced on this point they will eve become reconciled to the irreversible decree which has destroyed their ch social order.

If it be conceded by the laws that the men of property may buy a the poor as slaves, it may or may not be advantageous for the ind to invest his capital in that species of property. In all standard work political economy, the institution of slavery has been considered fro narrow point of view, and, for the most part, they concur in maintaini negative, that under all circumstances it is less advantageous to employ than free labor. The folly of this notion is demonstrated by the fa throughout the entire south there was no instance of a large plantatio vated by hired free labor. Wherever agriculture was sufficiently profit induce large investments of capital the labor of slaves was preferred, was only the small farms in the south which were worked by free labor rally by that of the owner and his sons. The universal preference g slave labor in agricultural enterprises was due to several causes. In tl place, it was on hand, and from generation to generation the habit of culti the earth by servile labor had become invincible. The slaves could not ployed conveniently and extensively in other pursuits, which require m telligence, and which make it necessary to collect them together in dang large numbers; and there was, besides, little demand for slave labor ex the plantations. The imperious manners of the slaveholders, who were th capitalists of the south, were little suited to the direction of free labor. felt, and not without reason, that freemen would revolt and abandon th at the most critical periods of the crops rather than submit to the ty driving process which was applied to slaves, and which was regarded as es by those who had never witnessed anything else. The very existence of s had thus produced a condition of things, and generated manners and which made it more profitable to employ slaves than free laborers. T sickly manufacturing enterprises which had begun to spring up in the so States, and to employ free labor, were, for the most part, under the ma of rthern men, or, at any rate, of men reared in those parts of the south t e were few slaves.

The habit of giving the preference to slave labor by the planters

another way operated to the prejudice of free labor. It has caused the poor white population to grow up in idleness, to feel that labor is degrading, and to be incapable, from disuse, of continuous labor. Slave labor thus justified the preference given to it by its tendency to degrade free labor and to render the free laborer worthless. Reasoning from the premises accepted by the entire school of political economists, therefore, it is safe to say that the slaveholders had the advantage of the argument, at least so far as slaveholding countries are concerned. Admit the existence of slavery, once introduce the system, and it will generate an atmosphere in which free labor will not thrive. The whole experience of southern men is to the effect that slaves were at all times, up to commencement of the rebellion, the most valuable property in the south. were always in demand at increasing prices, and the demand was always growing greater. Lands were soon worn out and abandoned, railroads and other stocks might prove worthless, but it was always safe to invest in slaves. Pigs and cattle were worth only a few cents per pound, negroes readily commanded almost as many dollars. The mere mention of these notorious facts is sufficient to refute the assumption that the individual could always more safely employ free than slave labor.

THAT CAPITAL INVESTED IN SLAVES IS UNPRODUCTIVE.

The economical evil of slavery lies deeper. It is not that individuals or cap- may not make money out of it, but that society, in the aggregate, cannot ney out of it. It permits and encourages an unnecessary investment c tal, and a diversion of capital from employments which would be gain- o the community at large, to one which is simply gainful to one class of iety at the expense of another. At a moderate estimate, the value of the laves of the south to their owners, in December, 1860, when South Carolina ommenced the work of abolition by making war upon the general government, as $3,000,000,000. The title of the owners has been destroyed, and the negroes, formerly slaves, have come into possession of it. There has simply been transfer of title from one class of owners to another, but nothing valuable has een destroyed. The strong arms and the skilled labor still exist, and new incitements to industry have been added to four millions of the southern population ho, hitherto, were only impelled by the fear of punishment. It is as if a d assize had been held, and a verdict and judgment had been given st the wrongful possessor. Only the title has been transferred; but no ty has been destroyed. If the slave was worth a thousand dollars to his er, he is now worth a thousand dollars to himself. He may throw it away pation and folly as his master often did; or he may employ it in the ocurement of a home for himself and his family, in the education of his chil- in surrounding them with comforts, and in raising himself and them in the of being. These are the ultimate uses of money, and they are worth as to the negro as they were to his former master.

here has doubtless been a waste of property, and a loss of time and the fruits industry, in the process of abolishing slavery by war; but this has nothing to do ith the point at issue. In asserting that capital invested in slaves is unpro- ive, and that the liberation of the slaves is only a transfer of title, without a of property, it is assumed that the change is made peaceably, and hout disorganizing industry. The object is to show what the country lost the admission of slavery, and what it will eventually gain by abolishing the ion; and not that the process of abolition has been unattended with loss. s the direct waste of war, in the destruction of houses, fences, and furni- the means of subsistence, there is also great loss in the disruption of , the failure to plant and cultivate, and to follow other industrial pur- as in times of peace. All this is fully conceded; but it is still true

that the three thousand millions of property invested in slaves has not b destroyed. There has been only a transfer of title, as there would be sequence of the verdict of a jury in a suit at law for an estate.

Supposing, therefore, that the transition from slavery to freedom had b made peaceably and without any disorganization or paralysis of industry, an it is plain that the south would now possess every resource of wealth and pro duction that it had while four hundred thousand white people claimed four mil lions of negroes as property. If the States or the general government desire to raise a direct tax upon real and personal property and polls, there would b the same resources on which to impose it. The emancipated negroes can pa as much tax for themselves as their former masters could have paid on them a property, and the land and other property would be no less valuable in conse quence of an augmentation of the number of persons endowed with the capacit to hold property. In like manner the power of the States for defence o aggression would not be lessened by emancipation, as the late civil war has s fully demonstrated. It is well known, and came at length to be recognized b the whole south, that the existence of slavery, by making a third of the popu lation enemies of their country was the great hindrance to success. If th negroes had been freemen, and had been inspired by the common desire fo separation from the north, the conflict would undoubtedly have been far m stubborn, and it would be hazardous to say that the result would have been that case what it is now. A nation, therefore, which has lost none of its re sources of revenue, and which has increased by one-third the number of it arms-bearing population, cannot be said to have lost anything valuable in con sequence of the abolition of slavery.

That slavery causes an unnecessary and therefore unproductive inves of capital may be made palpable by a familiar illustration: Supp tw farms, of one hundred acres of land each, are to be cultivated respectively wit free and with slave labor, and that in each the soil and whatever is ne to its cultivation is owned by the farmers, whom I suppose to be ne io and engaged in the same branch of agriculture; their lands adjoin, and equally valuable; they employ the same number of cattle and horses, the must lay out equal sums for utensils, and they must lay in the same qu t of provisions. They also employ the same number of laborers—suppose each. In all other respects their investments are equal, but as it regards lab a wide discrepancy exists. He who employs his poor neighbors to labor fo him need have no capital for that purpose, as, at the worst, they will work fo a share in the crop, on condition of being fed and clothed during the year, o they will wait till harvest for their pay, which can then be raised by the sal of the crop. If labor should be in considerable demand, and laborers require monthly wages, the farmer owning the soil, and all that pertains to farm, could borrow, from time to time, sums to pay wages; but, with the ployer of slaves, the case is quite different. After keeping pace in investm with his free-labor hiring neighbor in all things else, he must have, *in addi* a capital equal to the value of ten able-bodied slaves, which, at the beg of the civil war, and for several years prior thereto, he must have paid for the rate of fifteen hundred dollars each, or fifteen thousand dollars for the The hundred acres of land, supposing it to have been of the best quality would have been worth perhaps twenty dollars per acre, or two thousand the entire farm. His cattle and horses, and his utensils of husbandry, have required an outlay of two thousand dollars. Food and clothing for self and slaves, and provender for horses and cattle, one thousand. In all, capital would amount to twenty thousand dollars, of which just three-fourth consists of the unnecessary and therefore unproductive investments in beings as property. This fifteen thousand dollars of capital would be spensed with by the use of free labor, and with but a very trifling addi

other items of expense. The cost of land, of horses and cattle, of farming ls, and of food for the animals, would be the same. The food of the free s would cost as much as the food and clothing and the doctor's bills of res. In all these items the expenses or capital invested in the two s are parallel. As above stated, there is no absolute necessity for paying es in advance; but to make the comparison perfectly fair and free from cism, let it be supposed that the employer of free labor is under the neces- of having on hand a cash capital for this purpose sufficient to pay thly wages during the nine or ten months in which the crop is planted, d, and gathered. One thousand dollars would be sufficient for this pur- , and the accounts of expenses incurred would stand thus:

Capital necessary to grow cotton with free and with slave labor.

	Free labor.	Slave labor.
acres of land, at $20 per acre	$2,000	$2,000
e of cattle, horses, and farming tools	2,000	2,000
d and clothing of farmer, food of free laborers, and rovender for horses, cattle, &c	1,000	
d and clothing for farmer and his slaves, doctor's bills latter, and provender for horses, cattle, &c		1,000
of 10 slaves, at $1,500 each		15,000
for paying wages to free laborers	1,000	
Total investments	6,000	20,000

he reader will reflect that the suppositions here made as to the several items apital need not be strictly correct, in order to establish the principle in- ed. The cost of land and of other articles may be more or less, but the act is made palpable that the capital invested in slaves is not necessary e production of the cotton crop, and that it has nothing to do with pro- ion.

will be asked, if all this is true, why did not southern men cultivate cotton obacco with free labor? If with a capital of six thousand dollars, a man l make as much cotton or tobacco by the employment of free labor as r could make with slave labor, on a capital of twenty thousand dollars, was not free labor thus used in preference? The facts and considerations e stated will explain the motives of convenience which caused the preference given to slave over free labor, and the profit on the excess of capital em- d by the slaveholder was made up to him by appropriating the wages due e laborers. The free-labor farmer is under the necessity of dividing his with the men employed by him to make the crop. The slaveholder fed lothed his slaves in the coarsest and cheapest way. Of this fact there is l evidence furnished in a report of the Secretary of the Treasury, made the administration of President Polk, when every department of the al government was in pro-slavery hands. Circulars containing two series estions were addressed to leading planters, as well as manufacturers and hants, asking for statements of the amounts of capital invested by them ctively, their profits, the number of laborers employed, the cost of feeding clothing slaves, and the wages paid to free laborers, &c. The response from every part of the cotton and sugar regions that the cost of feeding and g a slave was thirty dollars per annum—fifteen dollars for food, and n dollars for clothing per annum; children half price. The profits per to the master varied from $150 to near $500. In the free States wages for laborers ranged from $8 to $12 per month, with board in each case. the close of the career of slavery, there was probably an increase in the

st of feeding and clothing slaves, and if the champions of the institution are to relied on, the disposition to feed and clothe better increased with the value the slaves. The profits of the two farmers arising from the sale of the crop ıy be stated, taking the above suppositions, and further assuming that a bale cotton is made for each acre of land, and that the cotton is worth ten cents r pound, as follows:

NET PROFITS OF FREE AND SLAVE LABOR CULTIVATION.

		Free labor.	Slave labor.
›oduct in each case, 100 bales, worth		$4,000	$4,000
›duct annual expenses as follows: for food and clothing of farmer, food of ten free laborers, and provender for horses and cattle, &c	$1,000		
›duct wages of ten free laborers, at $12 per month	1,440		
		2,440	
		1,560	
›duct food and clothing of farmer and ten slaves, and doctors' bills of latter			1,000
Net profits			3,000
Net profits, free labor			1,560
Difference			1,440

It will be remarked that the difference in the net profits of the two farmers st equal to the wages paid by the free-labor farmer to his laborers. Th m $1,440 is 9⅗ per cent. upon the capital invested in the slaves. In each ca ə aggregate wealth of society is equally increased, while in the one case s ousand dollars make the product, and in the other twenty thousand.

It must be obvious, upon reflection, that what is here found to be true ıgle individuals, is true of the aggregate number of farmers and plante ıere were about 5,000,000 bales of cotton produced in 1859, as reported in t nsus of 1860. In point of fact, there was much inferior soil in cultivation, and ge proportion of women and children were employed. But it is the unive stimony of planters that a good acre will make a bale of 400 pounds of pic tton, and that a good "hand" will cultivate ten acres. It is, therefore, ı ə sake of illustration, safe to take the supposition above, and to assume t ə 5,000,000 bales were grown upon 5,000,000 acres, by 500,000 able-bodi n, with corresponding investments as to land and other things, and it st nains clear that the investment in slaves is superfluous. The five hundr ousand laborers were worth $750,000,000, which sum is of itself nearly thr nes larger than was essential to the production of the cotton crop. We l n above that $20,000, with slave labor, produced no more than $6,000 w e labor, and at the same ratios one thousand millions were employed complish what three hundred millions would have done.

In like manner all the slaves of the south involved a corresponding a unproductive investment. They numbered nearly four millions, of al d both sexes, and were said by southern men to be worth from three to ousand millions of dollars. This vast property was not a gift to the south ople; it was an accumulation, and constituted, in fact, nearly or quite half alth of the south. In the planting States slaves were greatly more valua an all other property, real and personal, as will be seen by the following ive tables:

Value of real and personal property.

SOUTHERN.		States.	NORTHERN.	
l property in 1860.	Personal property in 1860.		Real property in 1860.	Personal property in 1860.
5, 034, 089	$277, 164, 673	Connecticut	$191,478,842	$149, 778, 134
3, 254, 740	116, 956, 590	Illinois	289,219,940	101, 987, 432
1, 722, 810	47, 206, 875	Indiana	291,829,992	119, 212, 432
9, 801, 441	438, 430, 946	Massachusetts	475,413,165	301, 714, 651
7, 836, 737	351, 636, 175	Michigan	123,605,084	39, 927, 921
9, 772, 684	359, 546, 444	New York	1,069,658,080	320, 806, 558
2, 476, 013	155, 316, 322	Pennsylvania.	561,192,980	158, 060, 355
		Ohio	687,518,121	272, 348, 980
9, 898, 514	1, 746, 258, 025	Totals...........	3,687,916,204	1, 463, 866, 463

ent to any one familiar with the condition of the country at bles are not to be relied on as furnishing an accurate idea of of different States—for instance, Ohio is made to appear han her older, more populous, and larger neighbor Pennsyl- State of Connecticut is placed ahead of Illinois, and Georgia ian South Carolina in personal property, although the latter rmer in slaves by many thousands. These facts only show ive adopted different standards of valuation. Some assess e value, others assess at one-half or two-thirds, and hence In another table of the census reports there is an effort the principle of valuation, but upon what data is not stated. ill answer my present purpose, which is to show the relative personal estate in the several States. It is seen that in the l estate exceeds in value the personal in every instance— oportion of three to one, and that aggregately the former is ies the latter. In the slave States the aggregate personal two-fold greater than the real, while in some States it is two reater, thus reversing the proportions as they exist in free s immense excess of personal over real estate consists of the which I have shown above to be utterly useless to the com- a productive agency.

SLAVERY AND MANUFACTURES.

ited a report made by the Hon. Robert J. Walker, in 1845, the Treasury, upon the subject of capital employed in the pursuits. Having shown that capital invested in slaves is the pursuit is agriculture, I will now undertake to demon- er that it is equally so in manufactures; and as I am less investments, and less capable of supplying illustrations by will take the actual facts, with the names of parties as fur- al report.

ie of Mr. Walker's circulars Mr. Samuel Bachelor, on the part n Manufacturing Company, at Saco, Maine, stated that the in 1845) had a capital invested in grounds, buildings, and ting to $550,000. Their business capital annually in- hase of raw material, &c., and in the payment of wages, ,000 The whole, therefore, amounted to one million 0.) But this is rather an over-statement as it regards ppose, it includes the whole amount paid during the

year. In agriculture it is necessary to labor for three-fourths of the year before the laborer can be repaid out of the product of his toil. But in manufacture this is not the case, except, perhaps, in a few instances. In manufacturing establishments money is coming in daily, and it cannot be necessary to lay u a fund at the beginning of the year to pay wages until the close. The busine capital, both to buy the material of manufacture and to pay wages, would b coming and going all the while; and perhaps of the $450,000 thus expende during the year not more than fifty thousand need be on hand at one time. S that, instead of a million, the York Manufacturing Company probably did not any one time have more than seven or eight hundred thousand dollars engaged every stage of the manufacture, from the raw material to the unsold fabri The number of men employed in the establishment was 200; the number women 900 to 1,200. Suppose the average number to have been, of both sexe only 1,200. Now to carry on such an establishment with slave labor it wou be necessary to own this number of slaves who were in the prime of life; their average value, even at that day, could not have been less than $700, a their aggregate value $840,000. It is clear, therefore, that cotton manufactu ing with slave labor would involve an investment two-fold greater than wi free labor.

In the manufacture of tobacco, cigars, and snuff the proportion of labor capital seems to be greater than in that of cotton. At least, such is true of case furnished by Mr. Walker's report. Mr. Enoch Hughes was engaged the manufacture of tobacco, snuff, and cigars. He stated his capital was $30,00 of which $20,000 was permanent, and $10,000 was used in the purchase material and the payment of labor. He employed one hundred persons, most females. One hundred slaves of similar ages would be worth $700 each, $70,000 in the aggregate. Add to this merely the $20,000 permanently invest by Mr. Hughes, and leaving nothing for the purchase of materials, and the s total is $90,000, or just three times the capital employed where free labor used.

In the manufacture of iron the same principle finds illustration. The E Furnace at Buffalo, New York, according to the statement of Mr. Calvin J. M the manager or proprietor, had a permanent capital of $50,000, of which $35,0 was invested in buildings and machinery, and $15,000 was business capit though in the course of the year $30,000 was spent for materials, and $15,0 paid out as wages. This illustrates the correctness of my remarks above, th a small business capital on hand, together with the daily receipts of a manu turing establishment, will dispense with the necessity of keeping on hand t whole disbursement of the year. The Eagle Furnace employed eighty m skilled laborers, who in those times of low wages and gold received one dol and a half per day. Slaves equally skilful, even then, would have been wo $1,200 each, or $96,000 for the eighty. Add this sum to the fifty thousa dollars of permanent capital invested by the Eagle Furnace Company, and t amount is $146,000, which would be necessary to carry on an iron furnace w slave labor, or three times more than is necessary with free labor.

I have all along assumed, in the above reasoning, that it would be practical to employ slaves in manufacturing. This is not true, except in a very limit way. In the first place, it was always the policy of the upholders of slavery keep the negroes in ignorance, and to offer them no incentive to labor, or to a quire skill. This policy would be a great hindrance to anything like exceller in the arts. But aside from this consideration, it would be dangerous to bri slaves together in great numbers; so that the idea of building up a great man facturing city composed of slaves, would be repellant to every slaveholdi instinct if it were practicable. Such an aggregation of slaves would be fruit of plots and insurrections, and it would be necessary to maintain an army re to suppress revolt. Such a thing might have been practicable in an age v

the idea of personal liberty was unknown; but in our day, when it is the aspiration of every human being in christendom, it will not do to allow slaves to measure their power with that of their masters.

ANALOGOUS DOCTRINE OF J. STUART MILL.

Analogous to the foregoing doctrine, that capital invested in slaves, though a part of the wealth of individuals, is no part of the national wealth, I find the following passage in the "Preliminary Remarks" to J. Stuart Mill's Political Economy. He says:

"In the wealth of mankind nothing is included which does not of itself answer some purpose of utility or pleasure. To an individual anything is wealth which, though useless in itself, enables him to claim from others a part of their stock of things, useful or pleasant. Take, for instance, a mortgage of a thousand pounds on a landed estate; this is wealth to the person to whom it brings in a revenue, and who could perhaps sell it in the market for the full amount of the debt. But it is not wealth to the country; if the engagement were annulled the country would be neither poorer nor richer; the mortgagee would have lost a thousand pounds, and the owner of the land would have gained it. Speaking nationally, the mortgage was not itself wealth, but merely gave A a claim to a portion of the wealth of B. It was wealth to A, and wealth which he could transfer to a third person; but what he so transferred was in fact a joint ownership to the extent of a thousand pounds in the land of which B was nominally the sole proprieter. The position of fund-holders or owners of the public debt of a country is similar: they are mortgagees on the general wealth of the country. The cancelling of the debt would be no destruction of wealth, but a transfer of it; a wrongful abstraction of wealth from certain members of the community for the profit of the government, or of the tax-payers. Funded property, therefore, cannot be counted as part of the national wealth. This is not always borne in mind by the dealers in statistical caloulations. For example, in estimates of the gross income of the country, founded on the proceeds of the income tax, incomes derived from the funds are not always excluded, though the tax-payers are assessed on their whole nominal income without being permitted to deduct from it the portion levied from them in taxation to form the income ot the fund-holder. In this calculation, therefore, one portion of the general income of the country is counted twice over, and the aggregate amount made to appear greater than it is by about thirty millions."

In like manner the title of a slaveholder is in the nature of a mortgage or lien upon the labor of the country taken by force, without consideration—not given for value received. The destruction of the title, to apply the language of Mr. Mill, "would be no destruction of wealth, but a transfer of it." In this instance, however, there is no "wrongful abstraction of wealth from certain members of the community for the profit of others. On the contrary, the abolition of slavery is the restoration of a *right* which has been unjustly withheld.

It may be shown how other articles which ordinarily cost nothing may be made, under peculiar circumstances, property to individuals, though they can never be counted as part of the national wealth. A man may live in a dark and close room, where artificial light would become necessary in broad day-time, and where a sufficient supply of air could only be obtained by an expensive machinery. In such a case, if there were any necessity for his residence in such a place, these poor substitutes for the clear light of the sun, and the pure air which surrounds his prison-house, would acquire value which he might transfer by sale to another man in like circumstances; but such property cannot have any general value, nor can it constitute any part of the national wealth. So, the slaveholder invests his capital in something which he could have the use of without owning it as property. He buys a rational being, whose incentives to labor for the sake of wages are stronger than the compulsory authority

of a master. There exists a necessity for owning the domestic animals, in (to make their services available. They have no artificial wants, no aspira or desires beyond those which nature has provided for in their instincts; are never to wear clothing nor to acquire education; they would never be to build them houses nor store them with provisions for winter, and it is or the property of a rational being that they can be made more comfortabl happy. They cannot of themselves cultivate the earth, nor gather up its for periods of scarcity; their only resource, and their only labor if left to selves, would be to eat what the bounty of nature spreads before them. with man in his lowest estate the reverse is true. His desires, and hop aspirations for knowledge, for wealth and power, are illimitable. He is wi the instincts which would enable him to live, but reason prompts him to and to save; and under favorable conditions the habits of laboring and s become second nature, if, indeed, they may not be said to be natural. T him as property is to stifle all the nobler impulses, and, as far as may turn him into a mere beast of burden, without aspiration for higher lif without a stimulant to improvement. It is therefore worse than useless slave a human being, and the nation which tolerates the institution in its l is as unreasonable as the man who should consent to have a hand bound body, and thus to pass through life.

Capital invested in slaves could be considered no part of the national w because it was unnecessary. It was three thousand millions laid out i purchase of something which was at command without being called pro It was profitable to the slaveholders to the extent of the pecuniary inju flicted upon the slaves. As the political economists would say, its functio to distribute wealth, not to produce it; and, as we have seen, the distrib while it was unjust, could in no possible way add anything to the resour the country.

WHAT HAS BEEN GAINED BY EMANCIPATION.

Thus far I have attempted to demonstrate the proposition that slavery in a wholly unproductive investment of capital, and that its abolition was n the destruction of title-deeds; while whatever there was of value in the during the existence of slavery still remains, or at least would have remai the institution had been put out of the way without war and bloodsh now propose to show what the south has gained with reference to its progress.

Capital invested in slaves being unproductive, the introduction of sl into a State diverts the energies of the people from its improvement. peculiarity belongs to no other species of unproductive capital. Slave penses with, and introduces a substitute for, free citizens by supplyir demand for labor; and yet it has been demonstrated above that the sub requires several times more capital to furnish it than is necessary to ob supply of free labor. Thus, taking the supposition above, if the free-soil i wishes to double the area of his farm and the amount of his product, he (so with an additional capital of six thousand dollars; whereas the slavel whose cultivation and product are only equal to the other, must accu twenty thousand dollars in order to make an equal addition to his crop. the additional capital be brought in by emigration from the older Stat thousand with free labor would do the work of twenty thousand with labor; and if we suppose equal sums invested in each of these modes, sa free and in a slave State, the free-labor investment would cultivate above times the number of acres, and produce three times as much cotton as the labor investment. In the latter case, also, the twenty thousand dollars take with it above thirty freemen to till the three hundred acres, while the culture would bring to the State only ten more slaves. Here, then,

..t form. There was no recovery, no regeneration, but in the destruc-
e system. It had been better if the institution had been peacefully but as that was not practicable, it is well for the south, in a pecuni- of view, that it is overthrown by violence, and not without great de- f other property. Henceforth there will be no more of the unproductive t of capital in human beings, and every dollar from which a revenue is n will contribute something to the national wealth. The slaveholders r been understood by the people of the north in one respect. They made to bear the economical reproach which properly belonged to self. They have been regarded as idle, prodigal, and thriftless; hey are, as a class, energetic, sagacious, and thrifty. They made l grew rich, while their system of slavery was inflicting the deepest n the country. Now that slavery is overthrown, they will exert their methods promotive of the general as well as of their own particular

THE VALUE OF LAND.

illustration of the advantages which the abolition of slavery has on the south, I will endeavor to show the direct effect of that measure of land.

s special and peculiar value attaching to those southern lands which otton, tobacco, rice, and sugar. The first of these articles, which is object of the commerce of nations, can nowhere else be grown so of such good quality as in the south. The tobacco of that oys, , the preference in the markets of the world over the products ile e and sugar are, as regards the United States, pe- so ls of the northern States enjoy no such monopoly grown in the free States, grows nearly as well in in Europe. Here, then, is an advantage which h, under favorable circumstances, would make he Union. Nothing but the presence of slavery n with northern lands. How this effect is show.

The value of a slave to his master is the difference between what he prod and what he consumes. If the slave could live without food and clothing, or u he could work as well for his master while finding himself in these neces his value would be increased to the extent of their cost. As things are, master must plant almost as many acres in corn and potatoes as in cotton order to provide for the wants of his slaves. The more the slave eats and drin and wears, the less is the net value of his labor to his master. The supply o his wants affords no market for the products of his master's farm; but, on th contrary, those wants constitute a necessary burden, and it is just as much th interest of the master to economize the food and clothing of his slaves as o himself and family. The slave is a charge to the master and to the land h tills, to the extent of his food and clothing. This necessity of feeding and cloth ing that portion of the slave population which is engaged in agriculture, there fore, so far from enhancing, must diminish the value of land. But the revers of this is true with reference to the free laborer. He is under the necessity o feeding and clothing himself, and consequently, so far from being a charge upo the landlord, he furnishes a market for the products of the soil, and enhance its value. It is universally true that slaves are a burden to their masters to th extent of their food and clothing, however much the value of their labor ma exceed the expense of maintenance. But in the exceptional cases in whic slaves are not engaged in agriculture, nor belong to planters and farmers, the wants, which must be supplied by purchase from the agriculturists, do enhanc the value of the necessaries of life, and add to the value of land. But the ag gregate number of such cases was small in comparison with the great body the slave population; one in a hundred of the whole would probably cover th entire number of slaves who were thus owned and employed.

The proposition here laid down, that the necessity of feeding slaves is a b to the soil, while the wants of the free laborer add to its value, will become evi dent by considering, first, that whatever the free laborer eats he pays for; and secondly, that if he ate nothing, if he were a sort of machine, endowed with th power of labor, and with a desire for pecuniary wages, the farmer could pay n part of them in kind. Instead of paying one-half the wages in board, as is no the case, all must be settled up in money. There would be less demand on th soil for its products, and the land would be less valuable. If the merchant the mechanic, and the professional man could live in society without food it is evident that the farmer could not employ their services. It is thei wants which make the market for the products of the soil, and if they ha no wants but money the farmer could neither sell anything nor pay any thing. Their wants hold out an inducement to the cultivation and improve ment of the soil, and give it its salable value. But the free laborer pays less than the merchant, the mechanic, or the lawyer for what he consu the farmer's crop. He receives not a peck of corn, a pig, nor a meal of vic which he does not as fairly pay for with his labor as the doctor, the lawyer, th mechanic, or the merchant with their money. In fact they, too, are often like the laborer, in the produce of the farmer, and the supply of their wants no more conducive to agricultural improvement, nor no more calculated to enha the value of land, than is the payment in kind of the free laborer. It is, course, not the interest of the farmer to pay wages; but since he must pay to the free laborer, it is to his advantage that the laborer, in common with community at large, is a consumer of the products of the soil. This necessi of the laborer enables the farmer to pay him in kind to the extent of nearly quite half his wages, and if the laborer has a family, in a greater proportion. I like manner it is against the farmer's interest to pay for the services of the phy sician or lawyer, but such expenses must be incurred. Physicians and law are necessary, and they must be paid, and they are in that way a necessary ev a drawback upon the resources of the farmer; but as consumers of the

ucts of the soil their presence is beneficial to him, and raises the demand for, nd the price of, everything he sends to market. The same is true of the merhant and the mechanic. The payment of their bills is contrary to the farmer's iterest; but, as consumers, their presence adds to the value of his land by enancing the price of its products. And in what particular differs the case of the ommon laborer? He is under no more necessity to work without wages than ie lawyer or the physician, the merchant or the tradesman, and he equally ays for what he consumes. The only shadow of difference between his pay nd that of others is the circumstance that it suits his convenience to be paid in ind, as to part of his wages, more uniformly than is the case of other consumers the farmer's products. The slaveholder has paid for the labor of the slave his purchase, and it is his interest to pay no more in the shape of provisions ian will sustain life and strength; but with the employer of free labor the reerse is true. He wishes to pay as large a portion of the wages as possible dictly out of the crop, and feels that he has found a market for his products to iat extent. The slave lives at the expense of his master, and, of course, what consumes can hold out no inducement to improve the soil, but, on the conary, must retard improvement. The free laborer lives at his own expense, and, efore, what he and his family consume must promote improvement.

SLAVE-BREEDING.

It may be proper to notice what may seem to be an exception to this principle the case of slaves reared for market. Here the planter is remunerated for his y of food and clothing by the sale of the negro, as he is remunerated for the rain and hay he feeds to the hogs and cattle he raises for market; and it may said with some plausibility that if raising hogs and cattle for market tends to hance the value of lands, why may not the rearing of slaves? The inquiry ly serves to bring out another radical incompatibility of slavery with the essenil laws of political economy, which result from the nature of things. A community which raises hogs and cattle for market thereby acquires the means of orting a larger population. It sells to distant communities commodities of hich it has more than it can consume at home, and thus acquires the means of rchasing from them articles not produced within its own limits. This has en the chief occupation of the people of the northwestern States for thirty ars past. They have grown rich, powerful, and populous by feeding grain hogs and cattle. They have thus been able indirectly to find a market for products of the soil, which the grain itself could not have found to the same , and the result has been a rapid increase in population, and a correspondg increase in the value of land. The facility of producing grain and grass in e northwest, and of raising stock for market, has been the real cause of the onderful progress of those States. Emigrants have flocked to them from all e older States of the Union, from Ireland, from Germany, and from almost ny part of Europe, in order to engage in their profitable agriculture and grazg, and to live on the fat of the land. Eastern Virginia, on the other hand, itered at about the same period of time upon rearing slaves for the southwestern ket. Such may not have been the deliberate purpose of her people, but cirstances forced them into the practice, and with what result? The census oles show that there has scarcely been any increase of population for forty ears, and the reason is obvious—she could only make money in the occupation f slave-breeding by depopulating her territory. In proportion to her exports f slaves has been her depopulation; and if she is not now reduced to half the umber of people she contained at the beginning of the trade, it is because her hite population was not wholly given up to this one pursuit, and because the market has not been greater than her means of supplying it. If there had been one but slaveholders among the white population, and if these had owned a good

stock of slaves to begin with, and a market equal to the power of supplj ruin of the State would have been complete. But the census shows that were 86,468 farms in Virginia in 1860, and only 52,128 slaveholders. also shown by the census report that of the 52,128 slaveholders co more than half of them owned but five slaves each and under; many tnc owned but one slave each. The effect of slave-breeding upon a cor therefore, has not had a fair test in Virginia. The prices of tobacco ana which have made these articles profitable crops, have also tended to mi the consequences of negro-breeding In 1859, for instance, Virginia proi 124,000,000 pounds of tobacco and 13,000,000 bushels of wheat, either of \ crops was more valuable than the negro crop, so that the energies of the p were divided between these ordinary occupations of agriculture and the pe one of slave-breeding for the southern market.

As in other cases, the capital invested in slave-breeding has been a sou profit to the owner, while it has been worse than wasted to society at Virginia was depopulated and impoverished by the trade, while her slaveh were growing rich.

In view, therefore, of these facts, I see no reason for modifying the pr tion, that what the slave consumes can hold out no inducement to the imp ment of the soil or increase its value. If he could live without eatin wearing, his value would be enhanced by the whole cost of keeping him.

HOW ABOLITION AFFECTS LAND.

If I have succeeded in making these propositions clear to the mind c reader, it will be conceded that the abolition of slavery in the southern Stat relieved the landed interest of the necessity of supporting four million peopl supply of whose wants was a burden to the soil; and at the same time it hanced the value of lands, by opening a market for the products of t s the wants of four million people, who must pay for what they consu . necessity of feeding and clothing the slaves was a drawback upon the ment of the land, and was to be deducted from the profits which their labor yi to their masters. The abolition of the system, by bringing into exi an equal number of freemen, who are under the necessity of maintaining selves, is an encouragement to improvement, and must cause an appreciati the value of land. Thus, the free population of the south, in 1860, was, in numbers, eight millions; the slave population four millions; and, consequ the inducement to improve the soil was made up of these circumstances the profitableness of growing cotton, tobacco, and other articles for foreig northern markets, together with the domestic market which the wants of millions of free people create, diminished by the necessary wants of four n slaves. The difference in favor of improvement was, therefore, only fou lions, and the southern lands not engaged in the production of foreign e: would have been equally valuable if the entire population had been onl millions, instead of twelve. But the abolition of slavery has removed cessity of feeding four millions of slaves, which was a burden upon the soi at the same time it has converted the emancipated blacks into profitabl sumers of the products of the land. The abolition of slavery has had the effect upon the value of southern lands, and will hold out the same enco ment to their improvement which would be produced by the introduction of millions of emigrants from Europe, or from the north. The effect of tl ; will become manifest whenever society and business in the southern Sta recover from the temporary paralysis which the terrible civil war has ca

There must be another important benefit to the landed interest, arising the transformation of four million slaves into freemen. It increases the num buyers of land. During the existence of slavery there were but eight an

ons of people in the south capable of owning land. The overthrow of tion has added four millions more; and thus, since the price or value of is dependent upon the number of bidders for it, there will necessarily be iation of land, as the result of emancipation. That the value of land pon the number of its free population who consume its products, and e to become its owners, is illustrated in the example of England, as with one of our western States. That country is proverbial for its The accumulated wealth of the people in the shape of houses and perperty is vast; but the land itself, without reference to the buildings mmands what appear to us fabulous prices. The yearly rental is genater than the fee-simple value of American lands; and it is within the moderation to say that the difference is ten to one in favor of English 'he landed estate in Illinois, for instance, though greater in extent and le than that of England, has not one-tenth the value of the latter. The , that England has twenty millions of inhabitants, and Illinois but ons. If the circumstances were reversed; if eighteen millions of the eople were to be transplanted to Illinois, with only the means of subsista year, their presence and their wants would at once give something -fold value to land in that State, while the abandoned lands of the land would at once fall in proportion to the demand for their products. ciple is illustrated, also, by the high price of even very poor lands in ty of cities, in comparison with the fertile soils of the rural districts.

EFFECTS OF SLAVERY ON POPULATION.

the most obvious effects of slavery is the retardation of the increase of n. The tables already presented are full of instruction on this point. llowing comparative statements leave no grounds for cavil or contro- compare New England with Virginia, New York with North Carolina, Kentucky, and Illinois with Missouri:

s.	Area in sq. miles.	Population in 1790.	Population to square mile.	Population in 1860.	Population to square mile.	Absolute increase of population to sq. mile. 1790 to 1860.	1850 to 1860.
....	30,000	96,540	3.22	628,279	20.94	17.72	1.50
....	7,800	378,717	48.55	1,231,066	157.83	109.28	30.33
....	4,674	238,141	50.95	460,147	98.45	47.50	19.12
....	1,306	69,110	52.91	174,620	133.71	80.79	20.74
ire........	9,280	141,899	15.29	326,073	35.14	19.85	.88
....	9,056	85,416	9.43	315,098	34.79	25.36	.11
....	62,116	1,009,823	16.25	3,135,283	....	....	....
....	61,352	748,308	12.19	1,596,318	26.02	13.83	2.85
....	46,000	340,120	7.39	3,880,735	84.36	76.97	17.03
a..........	50,704	393,751	7.76	992,622	19.57	11.81	2.76
		Population in 1800.				1800 to 1860.	
....	39,964	45,365	1.13	2,339,502	58.54	57.40	8.99
....	37,680	220,955	5.86	1,155,684	30.67	24.81	4.60
		Population in 1810.				1810 to 1860.	
....	55,405	12,282	.22	1,711,951	30.90	30.68	15.54
....	67,380	20,845	.31	1,182,012	17.54	17.23	7.43

It would have been fair to have omitted Maine from the comparison, as an offset to Western Virginia, since the latter has always partaken more of the character of a free than a slaveholding community. But the contrast is sufficiently striking as it stands. The remarkable fact is developed by the table that Massachusetts and Connecticut contained very nearly twice as many inhabitants to the square mile, in 1790, as Virginia contained in 1860, while Rhode Island was more than twice as populous at the former period as Virginia was at the latter. This important difference should always be kept in view in making comparisons between the free and the slave States. There should be something like equality in the conditions at the starting point. It is certainly remarkable that, with a dense population to begin with, in 1790, these free States have gained in far higher ratio to the square mile than Virginia, with its sparse population. Thus, Massachusetts gained 109.28 to the square mile in the 70 years following 1790, Rhode Island gained 80.79 during the same period, and Connecticut 45.50; while Virginia, with her ample domain, her fertile soil, her valuable mines, and her fine rivers and harbors, only gained 13.83.

In the other comparisons in the table, the slave States contained the larger populations at the beginning of the periods, with larger territories, (except as between Ohio and Kentucky, where the advantage is small in favor of the free State,) and equal fertility of soil. At the end of the period, these fresh and fertile slave States appear dwarfed by the side of their northern sisters, in all the elements of civilization. Between New York and North Carolina no one now would think of instituting comparisons, as it regards population, wealth, or any other indication of progress; yet, in 1790 the latter was the most populous State of the two. Between Ohio and Kentucky, and between Illinois and Missouri, the comparisons are particularly appropriate. The two former States lie contiguous, and are only separated by the Ohio river. Kentucky has the advantage of climate, and is quite equal to Ohio in soil, as well as in facilities for the transportation of commodities to market. Kentucky also had the start of Ohio in point of time, and contained, in the year 1800, *just five times* as many inhabitants, as can be seen by the tables. In 1860 Ohio contained more than twice as many inhabitants as Kentucky, all free and educated, while two hundred thousand inhabitants of the latter were ignorant negro slaves. Illinois, also, is contiguous to her slaveholding sister, Missouri, and is separated from her by the Mississippi river. In climate, soil, and productions they are very much alike, and in natural facilities of river navigation Missouri has the advantage. The latter State had, also, the advantages of an earlier settlement, and in 1810 contained nearly two-fold the population of Illinois. Yet, as in all the other comparisons, the race was overwhelmingly in favor of freedom. These illustrations can leave no doubt on any rational mind that slavery tends to retard the increase of population.

CONDITION OF THE FREE NEGROES.

WILL THE FREEDMEN WORK?

I have no occasion to enter into the discussion of the question whether the emancipated blacks will work as well as they did when slaves, or as well as white freemen. They may, or they may not; but the truth is indisputable that the capital invested in them while slaves was unproductive to society, and only tended to enrich one class of individuals at the expense of another. If it be true that the negroes will not work so well as formerly, the fact only goes to make the first introduction of slavery into the country the more deplorable; but it in no respect shakes the immutable truth that to make merchandise of human beings is to absorb the resources of the people in a manner wholly unnecessary and therefore unproductive; and it would still follow, that if slavery had never existed, the places of the slaves would now be occupied by a three or four fold greater number of intelligent and industrious free laborers, while the three thou

l millions of capital which was unprofitably invested in the slaves, three fold iplied in amount, would have assumed the form of improved agriculture, : and better houses, more and larger towns and cities, more manufactories, more commerce.

ut I by no means assent to the truth of the proposition, that the freedmen not work as well under the incitements of ambition and self-interest as they under the fear of punishment. The free negroes of the free States in past s, though laboring under a mountain of unjust prejudice and proscription, gh excluded by statute from the more honorable professions, and by mob vio- from many of the humbler, have never been more a burden to society, in pro- to numbers, than have white people. Even in the south, where the tyranny w and the tyranny of custom have been more severe than in the free States, e negroes managed to live, and in many cases to accumulate property. I have any years believed that a fallacy has existed in the reports of the census, hich it is made to appear that the free negroes, north and south, are in- ing in numbers at a rate less than half that of other classes. The fallacy t in the compilers of the census, but in the original collection of the tics. In other words, there has been a strong temptation on the part of early white mulattoes to pass themselves off for white persons. In all the 1, as well as the northern States, there was, either by statute, or by al decision, a limit beyond which a person of African descent ceased to be d in that category. This was generally the third or fourth remove from riginal black ancestor, so that if a man had less than that proportion of the an in him, he was in law regarded as a white man, and could sit on juries ote; and there are many eminent instances among this class of families have risen to social, as well as political distinction in the south. This s well understood in all the older southern States. When the mulatto y or individual has arrived at the doubtful confine which separates the two by a mere shade of coloring, prudence dictates emigration to some dis- part of the country, where the genealogy of the family is unknown. The prising *novus homo* has grown rich and taken social rank, it may be, with st, and at length, when, after years of prosperity and honor, a breath of scan- ke the poisonous simoon, reaches the neighborhood, that the genealogical tree en grafted upon an African stalk, it is too late to shake it from its firm base. langerous even to allude to the sinister fact, and may involve a duel. The s may whisper in secret corners, but the rich and powerful man maintains lace in society. In the ten thousand instances where no great success ls the career of the new man, his origin is perhaps never discovered by the riends and acquaintances he has made in his new place of abode. And all, the prejudice against the blood of the African is more conventional than ent in each individual composing society. No man will knowingly accept erfeit money, by which he is to lose; but it is a discreditable fact that the is not over scrupulous about accepting doubtful coin or bills, provided they urrent. And so with the social world, as it regards genealogies. It is known : south, and I suppose in the free States, that certain families have the taint rican blood in their veins; but they are rich and respectable, have married good families, perhaps filled high offices in church or State, and have thus amp of current coin. They are accordingly received at par value, whether : ballot-box or at the social board, and no questions asked.

ere were other causes during the continuance of slavery for the slow in- : of the free negro population of the south, during the last twenty years. were, first, "unfriendly legislation," by which they were compelled or ntully urged to leave that portion of the Union for the north, or for foreign ries; and, in the second place, it is a well-attested fact that many were ed to slavery by fraud and violence. It became a branch of the negro to kidnap and run off free negroes from the older States, where they

were numerous, to the southwest, where their labor was in demand. A and true-hearted Marylander assures me that he, with his father, had at times rescued twenty-three free negroes from the clutches of the negro on the Chesapeake bay, and many well-attested cases of the kind are on It would be a miracle if any race should flourish under such oppressions

The following facts from the census, showing the decline of the free in Louisiana, can only be explained in one or all of the ways here de The free negro population of that State reached its maximum of 25,502 year 1840; in 1850 there were but 17,462, and in 1860 the number was Now it cannot be pretended that the climate of Louisiana is less cong the negro than to the white man, nor that the means of living are much within the reach of that class in that State as in other parts of the The rapid decline of the free negroes, therefore, can only be explained or all of the three ways I have pointed out. They must have been driven out by cruelty, and enslaved, while others were passing rapidly process of "miscegenation" into the ranks of the white people. Fro is known of the state of society in Louisiana, and especially in New where the majority of the free negroes resided, there is much reaso lieve that the decline in their numbers is due rather to the bleaching than to the stern cruelty which would expel, exterminate or enslave although these latter causes of the decline of that unfortunate class operation.

WORKING OF EMANCIPATION.

But there is tangible evidence of the fact that the freedmen will work state of things now existing in the south. The monthly report of this ment, for February, has a table of the principal productions of agricu the loyal States during the past year. Included in it are the States of land, Missouri, and Kentucky. The two former abolished slavery in th 1864 and 1865, while in Kentucky the institution was practically bro by the events of the war, by the enlistment of a large portion of th bodied slaves, and by the practical freedom granted them by the authorities. Maryland, alone, presents anything like a fair test of w negroes will do in a state of freedom. Her people were at peace amon selves throughout the year, and were free from invasion from the south it is to be remembered that thousands of the laboring blacks and whit in the military service of the United States, which circumstance will f plain the slight falling off which took place in some of her productio pared with the year 1859, as reported in the census, if it was not offset equivalent gain in others. The figures for the two years are as follows:

PRODUCTS OF MARYLAND.

	1865	18
Indian corn .... bushels..	14,308,739	13
Wheat .... do....	5,479,635	6
Rye .... do....	476,770	
Oats .... do....	6,135,779	3
Barley .... do....	26,591	
Buckwheat .... do....	164,048	
Potatoes .... do....	1,274,393	1
Tobacco .... pounds..	29,963,672	38
Hay .... tons..	181,341	

er will remark that nearly a million more bushels of Indian corn ced in 1865 than in 1859; that there was a gain of above two million oats, and a small gain in the quantity of potatoes, (common.) These f production with free labor will very nearly offset the loss on the bacco, wheat, and rye; and, taken in connexion with the fact above egard to the enlistment of thousands of laborers in the military ser- op in 1865 must be regarded as the larger of the two.

y and Missouri were during the past year in a state of civil commo- ing at times upon civil war. Thousands of negroes and white men arms, and, as regards Kentucky, as many thousands of both races ves, the whites in the more southern States, and the blacks in the tates. These well-known facts fully account for the falling off in

PRODUCTS OF KENTUCKY.

	1865.	1859.
....bushels..	57,512,833	64,043,633
....do....	2,788,184	7,394,809
....do....	476,453	1,055,260
....do....	4,824,421	4,617,027
....do....	161,778	270,685
....do....	13,478	18,928
....do....	1,395,468	1,756,531
....pounds..	54,108,646	108,126,840
....tons..	127,301	158,476

n that the crops of grain, hay, and potatoes in 1865 are not far from nparison with those of 1859. The tobacco crop is just half that pro- re the war. This must be regarded as a very surprising result when stances are taken into view, and it leaves no ground to doubt that the resume its former thrift and industry. The results in Missouri are

	1865.	1859.
....bushels..	52,021,715	72.892,157
....do....	2,953,363	4,227,586
....do....	218,529	293,262
....do....	2,501,013	3,680,870
....do....	148,855	228,502
....do....	72,461	182,292
....do....	1,139,057	1,990,850
....pounds..	15,237,982	25,086,196
....tons..	519,479	401,070

parent from the above table that the crop of 1865, raised amid civil ore than two-thirds that of 1859. The corn crops are in the ratio of en, while the hay crop produced last year excels the other by one- mount. The hay crop is next in value and importance in Missouri corn, and exceeds the tobacco crop three-fold.

vas much complaint throughout the south that the negroes would not ediately upon the termination of the war and the enforcement of ion. But no fact can be clearer than that the indisposition to work rt of the negroes was caused by the inability to pay on the part of They were not willing to work without wages, and in the general

port of the government. They have been driven from their homes, in many cases by their former owners, (as they say,) because their husbands and brothers have left; and they have been abandoned by their husbands, if they ever had any. That they are unable to support their children and themselves in the present disordered state of southern society is not to be wondered at, nor does the fact furnish a sufficient reason for condemning the whole race as idle and worthless. According to the reports of the Freedmen's Bureau, as many of the white people as blacks of the south need government aid, and receive daily or weekly grants of rations.

It would be a most surprising fact if four millions of people suddenly released from centuries of bondage should not indulge in a protracted holiday, and the wonder is that the negroes have demeaned themselves with so much moderation. The fact would not be creditable to them if they failed to show their appreciation of the boon of freedom by a degree of noisy demonstration, accompanied by idleness for a brief season. To remain at home and pursue ordinary occupations with stolid indifference at such a time, they must have been less or more than human. But the idleness exhibited by the negroes has, for the most part, been inevitable in consequence of the lack of remunerative employment. No rational man could expect them all to go to work quietly for their former masters without a prospect of fair wages, yet, in point of fact, thousands have done so, and there is abundant reason for believing that, as a class, the negroes will become an industrious, thrifty, and law-abiding people, eminently docile, and emulous of improvement.

AGRICULTURAL COLLEGES.

NRY F. FRENCH, PRESIDENT OF THE MASSACHUSETTS AGRICULTURAL COLLEGE.

1 the close of the past century we find no account of any school or col- agriculture. In 1799 Thaer, the celebrated German writer upon agri- ., founded at Celle, in Hanover, an agricultural school, and in 1806 the f Prussia granted him a large tract of land, which he exchanged for an- at Mœglin, where, in 1807, he founded a practical school of agriculture, , in 1810, was constituted the royal school of agriculture.

is school is especially interesting, not only because it was the earliest on l, but also because it furnishes an excellent model, in many respects, for ur institutions. It is thus described by an English traveller who visited it :0: It comprised a model farm of 1,200 acres, and a college for instruc- The education was partly theoretical and partly of a practical descrip- The former was provided with three professors, who lived upon the prem- : one for mathematics, chemistry, and geology; one for the veterinary art, the third for botany and the use of the various vegetable productions of *materia medica* as well as for entomology. The practical instruction was municated by an experienced agriculturist, who pointed out the method of lying the principles of the several sciences to the daily routine of husbandry. e course commenced in September. During the winter months the time of pupil was occupied in the study of mathematics, and the six books of clid were mastered by him, whilst in the summer the knowledge thus ob- d was applied to the measurement of land, timber, buildings, and other ctical purposes. The first principles of chemistry were also unfolded. By of a good but economical apparatus various experiments either on a ge or small scale were performed. For the larger ones, the brew-house and l-house, with their appendages, were found to be highly useful.

Much attention was directed to the analysis of the soils, and the different sorts : with, distinguished according to the relative proportion of their component ts, were arranged on the shelves with great order and regularity. There was extensive botanic garden arranged according to the system of Linnæus, an barium containing a large collection of dried plants, a series of skeletons of erent animals connected with husbandry, and models of agricultural imple- its—all open to the examination of students. The various implements used n the farm were all made by smiths, wheelwrights, &c., residing around at the institution, and the pupils were allowed access to the workshops, and ouraged to make themselves masters by minutely inspecting the implements the niceties of their construction.

'his school is set down in Dr. Hitchcock's report in 1851 as still flourishing, i four professors, twenty students, and 2,480 acres of land.

the same year, 1799, Fellenberg established upon his estate of Hofwyl, · Berne, Switzerland, his celebrated institution, where, in addition to a ol for the poor, was also one for the sons of gentlemen of wealth who wished to y ricultural science and practice. This institution survived its founder about years, and was discontinued about 1847. In the same year, 1799, the Schwartzenberg founded a similar institution at Kruman, in Bohemia, on

a domain of 300,000 acres. This school is still in successful operation, a we find no recent account of it. It is set down in Dr. Hitchcock's list, immense territory, its number of professors and pupils being blank.] scribed in the new American Cyclopedia as having large collections, c models of agricultural implements, insects, fruits, plants, minerals, ana barium, with a botanic garden, conservatory, and astronomical observator instruction is gratuitous, and the object of the institution is to render the s taught as practical as possible.

Next to these were established the institutions in Germany, to be mc in their place.

DEMAND FOR PRACTICAL EDUCATION.

Both in Europe and this country there is a growing impression that leges and schools give too much of their time to the classics and to knowledge, and too little to what is practical. There was good sense ancient philosopher who, when asked what is most proper for boys t answered "that which they will want to practice when they are men."

If all men could learn everything, or if the major part of our youtl were training for a life of study and not of work; or, again, if we were general, compelled to give up study at twenty or twenty-five, and at earning a living, we might well enough devote all our school and coll to mere discipline of the mind. The following statement by one of the committee of Harvard University will help to illustrate our views:

"To be admitted into the freshman class, the candidate must pass an nation in Greek, Latin and mathematics, in which he must show himself to acquainted with all Virgil, Cæsar, Cicero's Select Orations, &c., with the A of Xenophon, three books of the Iliad, &c. But he is not required t quainted with any modern language, not even his own. He must be write Latin and Greek, but he need not be able to write English," &c.

"For the two ancient languages, Greek and Latin, the University prov instructors. For the *four* modern languages, French, German, Spanish, it provides three instructors. The compensation paid to those teache small that one of them has been compelled to resign his situation du last year, and another very valuable teacher of German is scarcely ret He says further, "Hitherto the study of modern languages in the Un has been systematically discouraged by a lower scale of rank for good ship in this department than in the others. The best recitation in Fre German only gave a mark of 6, while in Latin, Greek, and mathema highest mark was 8. Scholars, therefore, who studied for rank, and d part in commencement, could not afford to take modern languages as an in the senior year."

We are happy to learn that French is hereafter to be required, and nc as an elective in the freshman and part of the sophomore years, though is still an elective.

Here we find that in a republic, where German and French are tl languages spoken by a large proportion of the inhabitants of some States—in a country where the citizens of each State enjoy equal ri citizenship in every other State—where the whole people are restless, drawn by self-interest to try their fortunes far away from their native and so are constantly finding occasion and almost necessity to use both and German—we find in this republic the leading university complet education of her students without requiring them to understand a either language. And the same, substantially, is true of our other coll of the great universities of England.

We can hardly find among our political men competent ministers to courts, who can speak the court languages. Now, while, in the languag

of Congress, we would not exclude classical studies, but would allow all o please to pursue them, we would insist that no young man should be pro-ced educated at any college until he could speak and write readily the nch and German languages.

The advocates for the classics claim that, in addition to these studies being for the discipline of the intellect, taste, memory, and imagination, their dents are enabled to study in the original Greek and Latin the works of the at master minds of antiquity. "Nor," says one of these advocates, "can nslati ns avail anything for this purpose. The essential spirit and etherial ty of the orignal vanish entirely with the version." If, however, it be true, ne report of her Majesty's commissioners upon the great schools and colleges England, made to Parliament in 1864, seems to show, that graduates of the iversities, after all their training, cannot read these originals, it would seem be wise to resort to translations before, rather than after, some ten years' dy of the dead languages. Mr. Neate, M. P. for Oxford, gives the following his estimate of the grand result of education at Oxford: "I do not hesitate say that the great majority of those who take a degree in Oxford, after hav-spent ten or twelve years of their life in the all but exclusive study of Latin l Greek, are unable to construe, off-hand, the easiest passages in either lan-ge if they have never seen them before." The commissioners themselves , "Of the young men who go to the universities, a great number never ac-so much Latin and Greek as would enable them to read the best classical nors intelligently and with pleasure."

A careful investigation would no doubt lead to the same conclusion in refer-e to the graduates of American colleges.

While we do not undervalue the classics, and should hope that every boy , if possible, possess some knowledge at least of Latin, as being the basis dern languages, and while we would give to abstract mathematics all the hat the student can spare from such knowledge as we include among "the essaries of life," we do believe that, for a large class of our people, a system education should be framed which may combine more of the practical with theoretical. Borrowing from the heathen mythology some reverence for t Titanic power with which all its deities and heroes are endowed; we would er a more rigorous manhood, that shall not undervalue muscle and energy erform the actual labors of life. The goddess of wisdom (as Pallas-Athene) also the goddess of arts and of scientific war; and knowledge is always tent with power to execute some practical work.

.ne establishment of scientific schools in connexion with most of our colleges, the existence of such institutions as commercial colleges and institutes of logy in various States, indicate that there is a public sentiment demand- ething different, at the present time, from the facilities for education n by our literary colleges. Even the old universities of Oxford and Cam-e, in England, have so far yielded to this popular sentiment that they e, within a few years past, established what are termed "middle class ex-nations" for the promotion of education outside of their regular classes. minations of youth of the middle classes are held at stated times, by com-ees, and certificates given them, which may secure them situations to which r education may entitle them. The objects of the examinations are to en- the middle classes in the pursuit of learning, and to guide them in their ss in their preparations for business in trade, manufactures, the arts, or lture. The foundation stones of republicanism are *equality*, *progress*, and *nity of labor*. We who are charged with the establishment of educa-itutions should see to it that every element that savors of caste, of acy, of distinctions against labor as such, should be carefully excluded. degrading only as it is associated with ignorance and vice. The n, the hospital physican, the great captains by sea and land, per-

form labors disagreeable, disgusting, arduous to the extreme of human endurance, and yet we reverence and applaud the laborers for the skill, the intellect, the high and noble motives which actuate them. By combining with all labor, intellect and skill, or, in other words, by educating the man who performs the labor, we may abolish these distinctions, and place the farmer and mechanic on the same plane with the learned professions.

THE ACT OF CONGRESS.

Congress by an act entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," approved July 2, 1862, granted to each State, for such purposes, an amount of public land equal to thirty thousand acres for each senator and representative in Congress, to which the States are respectively entitled by the apportionment under the census of 1860.

The subject of agricultural schools and colleges has long attracted the attention both of our people and legislators, and many attempts, most of which have proved failures, have been made to establish such institutions. The disposition to expend money in large and expensive buildings, and to indulge the American propensity to own all the lands that join us, induced Congress, in the act referred to, to fix judicious restraints upon the States accepting its grant. To the careless observer, a college is, chiefly, a group of magnificent buildings, with pleasant surroundings of lawns and trees, where students are expected somehow to gain an education, however starved and pinched may be the internal organization, including the corps of professors and teachers.

Seeing how many institutions have been ruined or contracted in their usefulness by extravagance in the external management of their affairs, and especially by indulgence in architectural display, Congress wisely provides "that all the expenses of management, superintendence, and taxes, from the date of the selection of said lands previous to their sales, and all expenses incurred in the management and disbursement of the moneys which may be received therefrom, shall be paid by the States to which they may belong, out of the treasury of said States, so that the entire proceeds of the sale of said lands shall be applied, without any diminution whatever, to the purposes hereinafter mentioned;" and that "no portion of said fund, nor the interest thereon, shall be applied directly or indirectly, under any pretence whatever, to the purchase, erection, preservation or repair of any building or buildings."

To guard against loss of the fund by improvident investment, the act prov that all moneys derived from the lands granted shall be invested in stocks the United States, or of the States, or some other safe stocks yielding not l than five per cent.; and that if any portion of the fund, or of the interest ther shall be lost or diminished, it shall be replaced by the State, so that the capi shall remain forever undiminished, except that a sum not exceeding ten cent. upon the amount received by any State under the act may be appli the purchase of lands for sites or experimental farms, whenever authorized by the legislature.

The general object and character of the colleges thus to be established briefly stated in the fourth section of the act, which provides that the interest the fund shall be inviolably appropriated by each State which may take a claim the benefit of the act, "to the endowment, support, and maintenance of least one college, where the leading object shall be without excluding other tific and classical studies, and including military tactics, to teach such bran of learning as are related to agriculture and the mechanic arts, in such m as the legislatures of the States may respectively prescribe, in order to pr the liberal and practical education of the industrial classes in the several suits and professions of life."

object being to discuss the subject in such a way as to aid those who are ged in organizing colleges under the grant of Congress, it is important to at the outset what limitations are prescribed by the act. The grant made by Congress to all the States, and it was then, and still is, impossible devise a defined plan to be adopted by all. The New England States, with heir thoroughly organized system of common schools, require different colleges rom the southern States, where no such system is known, or the new States of the west, where society has hardly begun to crystallize into towns or villages. Great latitude was therefore left to the several States in establishing their respective institutions under the act.

Certain marked features, however, remain prescribed by the act of Congress, which good faith, if not the power of the law, requires each State to incorporate into every institution benefited by its grant. "The leading object" of the college shall be, says the act, "to teach such branches of learning as are related to agricultural and mechanic arts;" and the title of the act expresses the same general object—to "provide colleges for the benefit of agriculture and the mechanic arts."

These fundamental provisions call for the establishment of institutions different from our ordinary colleges, which can in no fair sense be said to be maintained the benefit of agriculture and the mechanic arts, or to teach especially such branches of learning as are related to agriculture and the mechanic arts. In a e and general sense, all learning may be said to benefit agriculture and the hanic arts, and to be related to them; but the colleges maintained by the grant of Congress are required to be distinctively and essentially of this racter. It is therefore a fraud on the act for a State to transfer the bounty Congress to existing literary institutions without requiring them, at least, establish a regular course of study in such branches of learning as are ctively related to agriculture and mechanic arts.

find nothing in the act to limit the colleges established under it to the re practical teachings of agriculture and mechanics; but, on the contrary, the , so far as developed, is of colleges of the grandest scope, where, "without uding other scientific and classical studies," the branches of learning related to iculture and the mechanic arts are to be taught "in such manner as the legis- s of the States may respectively require, in order to prosecute the liberal practical education of the industrial classes, in the several pursuits and pro- ions of life." Several points should be noted in the language of the act just ted.

"Liberal" as well as "practical" education is provided for, and education in several pursuits and "professions" of life.

The grand idea which seems to underlie the whole act, and which, no doubt, was prominent in the minds of the framers of it, is the elevation of the laboring ses. This is clearly expressed in the language already cited, giving the d object, which is "to promote the liberal and practical education of the trial classes," &c. The "industrial classes" are ordinarily those engaged agriculture and the mechanic arts. To raise them to equality in education with the classes more favored by fortune, is the first care of a republican gov- ent. The rich may educate their own children, but the government should care that the poor are not neglected. Already colleges exist in most of States, where youth, a majority of whom are from the wealthier families, educated for the professions. Colleges to teach the branches of learning ng to agriculture and the mechanic arts offer peculiar attractions to the ial classes, and it is desirable to bear in mind, in their organization, the that these classes have not, usually, large means at their command, and itutions for their benefit must furnish the means of education at moderate

n, it is clear that, although the primary object is the education of the

industrial classes, it is not intended so to conduct their education as to them to any class, in their after life. The object is rather to offer to the i trial classes such facilities for education as they are most likely to use, to them instruction in the branches relating to agriculture and mechanics, to them instruction in "scientific and classical studies," and finally to prepare t by a "liberal and practical education," not only for farmers and mechanics for success "in the several pursuits and professions of life."

WHETHER INDEPENDENT OR CONNECTED WITH OTHER INSTITUTIONS.

Whether the college, to be established under the grant of Congress, shall an institution independent, or whether it shall be, to greater or less exte connected with existing colleges, is a question raised in every State where t subject has been discussed.

Assuming that a union with an existing institution is consistent with the of Congress, let us consider the expediency of such a union. The questio attracting much attention in Europe, particularly in Germany, where, as in t country, scholars, and especially officers of universities and colleges, gener advocate such a connexion. The principal arguments in favor of a union, far as relates to this country, may be arranged under a few heads:

1. The great cost of buildings for lecture and recitation rooms, halls, librari laboratories, and many other accommodations, may, for the most part, be save since in all our colleges there is accommodation for many more students than no attend.

2. Existing institutions, too, are already supplied with museums of natu history, geology, comparative anatomy, and the like, and with libraries for ge eral reading and scientific works, all of which may be available to a la number of students. It requires a long period of time as well as a large a of money to form such collections, and without them an agricultural coi could not be expected to maintain a position of dignity or usefulness.

3. Existing institutions have organized corps of professors, many of them of chemistry, physics, botany, physiology, mathematics, ethics) the same would be necessary in the agricultural college, and those, with slight addi to their labors or numbers, could give instruction to the students in agricul and mathematics.

4. The great leading minds of the country are already engaged and attac to existing institutions, and it will be found impossible to organize new colle with competent professors.

5. The union of the highest education in the sciences, and in their applicati is impracticable; and true education consists in the apprehension of principl and in general discipline, rather than in practical arts, which may be readily learned afterwards.

6. That knowledge is advanced by the devotion of thoroughly trained min to special branches of science, whereby discoveries are made and actual additi to the sum of human knowledge are published to the world. The Smithson Institution at Washington and the Museum of Comparative Zoology at C bridge, Massachusetts, are illustrations of this special mode of study, and all higher universities and colleges, incidentally at least, to some extent, adopt same method.

The reasons in favor of independent agricultural colleges, and the answer the foregoing arguments in favor of a connexion, may be thus stated:

1. Admitting the great value of libraries and museums already for well as the economy of using buildings already built, it is fair to sugg funds for the erection of new buildings, and for libraries and collections, usually be raised by local subscriptions or by contributions, in aid of an cultural college, from persons who would give no aid to an existing institu

is a deep interest among farmers and mechanics in the success of colleges ed to their practical wants, which is of more value than all that the older s can offer.

it is no disrespect to existing institutions to maintain that no one of them within itself a corps of instructors competent to manage an agricultural ge. Wedded to their own approved and time-honored theories, almost imously distrusting the possibility of a union of manual labor and study, customed to instruct mainly in theory, unfamiliar with practical agriculture, lieving that Latin and Greek furnish the best discipline for the youthful mind, regular professors in existing colleges are peculiarly unfit to develop or exte a new and peculiar plan of education. The agricultural college, thus trolled, would of necessity sink into a subordinate branch of the university, fail of all its purposes. In an independent institution, under a government voted to its peculiar objects, the professors of the other colleges might be cured to deliver courses of lectures in their several departments, and thus ir learning may be made available to the new college. Nearly all college fessors have periods of leisure which they devote to lectures abroad, and h interchange would be mutually beneficial.

3. The arguments in favor of a union, based upon the incompatibility of the ndy of abstract and applied science, and upon the idea that the advancement knowledge rather than its diffusion is the chief object in view, are founded a misapprehension of the intention of Congress as shown in the act.

The manifest object of the act is, as has been already shown, to furnish a e practical education for the industrial classes than other colleges afford; if such education is incompatible with the theories of existing institutions, re can be no union between the two systems. Again, the new colleges are igned to educate boys, and not to advance the knowledge of learned profess-. Their first object is to diffuse knowledge already existing, to teach their ils what is already known to the best farmers, the best mechanics, and to professors of the various sciences—boys between the ages of sixteen and nty-one, incapable of receiving education beyond this. It is not expected them that they should make discoveries in science, or enlarge the boundaries human knowledge. Let us train them in body, in mind, in taste, in morals, eloping each capacity harmoniously, to make them perfect men, robust and nly, with knowledge of men, of business, of practical affairs—observers and s of nature as well as students of books—and so prepare them for contact in the world "in the several pursuits and professions of life."

4. The essence of republicanism is equality and freedom from caste. They ho advocate union do not, in general, propose to annex farms to the existing lleges, and so do not intend to make manual labor a part of their system. hey thus avoid the division of their students into classes of scholars and laborers, r sacrificing the advantages which, in another place, we claim for manual labor. o far, they doubtless do well; for the harmonious operation of any system in hich a part of the pupils should be required to perform farm labor, in the cos adapted to it, and another part should be exempt from labor, would be ssible; and the case would be even more manifestly hopeless were the mpt made to introduce a class of laboring boys into the ranks of an estab-ed institution, where the older classes had, by the natural course of their ition, imbibed the common prejudice against manual labor.

The customs of students in old institutions seem fully as strong as the authority the faculty. The attempts to abolish *fagging* in England, and *hazing* in ica, in the universities, has taxed the utmost power of the authorities, with tial success. This love of power and assumption of superiority seems e of the innate depravities of students, and the experiment of introduc-r class, to be known distinctly as agricultural or mechanical, even with-uirement of labor, would not be found without its embarrassments.

If, again, the agricultural students are not distinguished from the rest, we remaining only our old colleges, and our whole plan of agricultural colleges destroyed.

The opinion of Dr. Hitchcock himself, president of Amherst College, w decidedly in favor of an independent institution. His reasons why mere agi cultural professorships are insufficient, and in favor of independent agricultu colleges, are briefly as follows: 1. Because lectures upon such subjects attra but few of the students of colleges, most of whom are looking forward to pi fessional life; 2. Because the two classes of students who would thus be broug together would have too little sympathy to act in concert and as equals in t same university; 3. Because, without such concert and sympathy, one or of the classes of students would feel no pride in the institution, and without su *esprit de corps* it could not prosper; 4. Because the field is wide enough to requ such establishments. The principles of agriculture are based upon a large part the physical sciences. No man can understand the *principles* of farming w is not more or less acquainted with chemistry, anatomy, physiology, bota mineralogy, geology, meteorology, and zoology; and then the practical p requires an extensive acquaintance with various branches of mathematics a natural philosophy. 5. Because it demands extensive collections of vari kinds in order to elucidate the principles of husbandry; enough, indeed, belong to any scientific institution, and too many to form a mere subordin branch of some institution with a different object in view. 6. Because the nu ber of instructors must be so large that they could not conveniently form adjunct to some other institution.

MANUAL LABOR.

Whether students in agricultural colleges shall be required to perform man labor, is a question which everywhere excites discussion, and which deser most careful consideration. Learned professors, and indeed nearly all who h been engaged in education in our academies and colleges conducted on t ordinary principles, doubt the success of combining labor with study.

Manual labor schools were a few years ago much advocated. The idea up which they were based was, that students by laboring a part of their time mig defray the expenses of their own education. It was supposed that four or hours' labor daily, well applied on the farm or in the workshop, might not or pay the board but the tuition of the pupil, and all his incidental expenses. T difficulty, however, was not in the theory, but in its development. A sin faithful industrious young man in a farmer's family might, no doubt, by ev four hours' daily labor, pay for more than his board; and perhaps a practi farmer might take into his family a small class of such youths, and teach th practical agriculture, and receive fair compensation for their support and assistance to them, by their labor for a third or half the time. The farmer wo invest in the enterprise only the supplies for his table and some additio house-room. His teachings would be given without loss of time from his bu ness, and he would make no expenditures for apparatus, or for buildings lecture and recitation rooms.

Suppose now that this same farmer undertakes to enlarge his plan of usef ness, and, instead of his small class, to educate two hundred boys in agricultu not only practical but scientific; to teach them not only manual labor and co mence farming by example, but to give them a regular course of education chemistry, physics and engineering, natural history, comparative anatomy a physiology, including veterinary surgery; to instruct them in French a German, and, generally, to give them, in the language of the act of Congr "liberal and practical education in the several pursuits and professions of li How can he do it? He must erect large and expensive buildings, with lecture-rooms, and museums and laboratories; he must employ prof

learned in the several departments, who must be paid enough at least to support them; he must provide his students with rooms for lodgings and for study, and make provision for their board; he must expect only the average amount of intelligence, industry, and fidelity in his pupils; and he must provide for the profitable employment of his two hundred boys, in all seasons—summer and winter, rain and sunshine. If he finds his own time occupied on the farm, he must employ some discreet educated person to take general charge of his establishment, to organize classes, conduct correspondence, listen to the complaints and requests of the students—in short, to *preside* over the enterprise, which it may be perceived has grown from a farmer's family into an agricultural college, with a president, professors, the usual expensive buildings, and our farmer himself as farm superintendent. The main object now being to educate two hundred boys, and not merely to farm profitably for the farmer's benefit, incidentally teaching a half dozen young men, the result of the scheme pecuniarily is entirely changed.

Thoughtful men might have foreseen what experiment proved, that manual labor schools as such—schools where the pupil's labor was to pay all his expenses and those of the school—must fail. It is difficult enough for the average of men to succeed in life when they devote themselves to one object, and give to it all their energies; but when they undertake a grand project like education, and expect that an incidental adjunct like a system of half-time labor shall maintain it, their disappointment is sure.

When we consider, further, that the men who have undertaken to establish manual labor schools have not been usually of the class called practical, but rather of the enthusiastic and philanthropic order—educated rather in theory than otherwise, it would seem strange, indeed, if they should be able even to conduct fairly experiments involving farms and workshops, buying and selling, and all the complicated machinery of education and self-support combined.

The failure of manual labor schools furnishes no argument against manual labor in agricultural colleges, but tends to prove only that such labor cannot be expected to be very profitable as a matter of dollars and cents, however profitable it may be as a part of a system of education.

It should be distinctly understood by the public, by legislators, and by all connected with these institutions, that the principal object is the education of the pupil, and that this object is kept in view in his hours of labor as well as in his hours of study. Profit and education may be quite inconsistent in many instances. The young man will earn more for the institution if placed in the employment which he best understands, and kept there regularly through his course. His education will be best promoted, on the other hand, by allowing him to engage in those branches of labor of which he has no knowledge.

It is frequently said by advocates for manual labor that three or four hours' labor a day ought to support the pupil. The same persons, if you ask them, will say that the pupils should be taught to perform with their own hands every process of farm labor. Let the farmer test this matter by applying the question to his own case. How much would it profit him, if he has a fine dairy stock of twenty cows, to have them milked for a fortnight by twenty boys who never had milked a cow before? How much richer would he be to set twenty boys, who never mowed a swath before, into grass fields to mow for him a week, and furnish them scythes? Ask similar questions as to all farm operations, fencing, cutting timber, planing, sawing, tending stock—as to gardening, pruning, grafting, budding, transplanting, and we shall see that unskilled labor of boys can be of little value; especially when they are employed in large numbers, so that they cannot be constantly superintended and watched as a farmer would do with his own family.

It is important to organize our colleges with the right idea upon this point. If legislators and trustees assume that student labor must be profitable and pro

ductive, and insist that it shall be made so, they compel their officers to sacrifice the prime object of their instructions, or to disappoint the expectations of the public. The writer visited the agricultural colleges of Pennsylvania and Michigan in June, 1865, and carefully investigated this subject at both institutions. He believes that the views already expressed will be fully confirmed by the testimony of the officers of those colleges. In another place we shall have occasion more particularly to refer to the systems there in operation. Man labor should be required of every student, because in no other way than by actual practice can a man learn the proper use of implements. The processes of husbandry can no more be learned by study, than one can learn by study how to ride, or skate, or swim. A four years' course of lectures without practice would never teach a youth to mow or plough, or to plant trees, or graft or bud them. No man can safely go into the market to buy or sell live stock, seeds, manures, or any product of the farm, without practical and daily familiarity with such kinds of property.

Again: no person without a thorough knowledge of the processes of husbandry is fit to direct labor. The relations between proprietor and laborer are very delicate in this country. The laborer is intelligent, and knows when he is fairly treated, and will soon learn whether his employer is entitled to respect. [M]any gentlemen purchase farms, and entirely fail in their hopes of enjoyment of ru[ral] life because they do not know what a fair day's work is. They are unre[aso]nable in their demands, and find fault with the poor fellow who has done a [fair] day's work, and the laborer feels that his best efforts are unappreciated, and ceases from his honest endeavors.

To encourage men of wealth of all pursuits and professions to create and occupy tasteful homes in the country is a legitimate object of agricultural education, and this can only be done by teaching the proprietors themselves the practical details of the farm, or by educating a class who shall correspond to the land stewards of England, who are competent to take full charge, for a fai[r] salary, of large estates.

Almost every merchant, shipmaster, and manufacturer looks anxiously forward to the time when, bidding adieu to the peculiar cares of his own occupation, he may retire with a competence, perhaps to his paternal acres in [the] interior, perhaps to some elegant suburban residence, and devote his d[eclining] years to the peaceful pursuits of agriculture. The long-expected day arri[ves] and "with sweet dreams of peace" the rural home is secured. Field is add[ed] to field, and costly barns and stables are erected. Extravagant prices are [paid] for Short-horns, and Jersey's, and Devons, as caprice or the casual suggestion o[f] friends may dictate; magnificent operations in draining and subsoiling, i[n] planting orchards and vineyards, are commenced. Guano and phosphates, bone dust and poudrette, are purchased and applied to hasten nature's tardy op[era]tions. Heneries and duck ponds are constructed, and stocked with fo[wls of] wonderful names and pedigree. The dairy, with its never-failing spring, w[ith] the thousand appliances recommended in modern treatises, is elaborately fur[]nished. Oxen and horses, ploughs and harrows, carts, harnesses, hay-cutters, root-cutters, mowers and reapers, with an endless variety of small tools, all of the most costly description, are added to the working capital, and chee[rfully] paid for, with the certainty that by and by the harvests will bring a rich r[eturn,] and the proprietor will rejoice in his successful experiment in scientific f[arming.]

A very few years, however, are sufficient to reverse this pleasing p[icture.] The "hired men" are unfaithful and indolent; the fancy cows break into cornfields or young clover, and are ruined; the drains are obstructed by frosts of the first winter; the apple and peach orchards and vines yield fruit; the poultry cannot keep enough feathers to cover their nakedness, much less can they afford any eggs; the potatoes rot; the horses fall lame [unacco]untably, and, to cap the climax of misery, the kitchen help goes

, and the "angel in the house" either takes refuge in a fit of illness or finds lef in tears, with an occasional reminder of "I told you so." Scientific is pronounced a humbug, and our disappointed but worthy citizen sud- ls out at a sacrifice, and returns to his city home "a sadder and a ." Such cases are constantly occurring, and they not only bring dis- ointment to the parties themselves, but discouragement to all who would elieve that agriculture may be made, at the same time, a rational amuse- and a safe and profitable business. These men fail because they know g of practical agriculture themselves, and because we have no class com- t to take charge for them of their agricultural affairs. Manual labor should required in agricultural colleges, because the cultivators of the soil are ly the owners of it, and because convenience, as well as the theory of our rnment, requires that the head and the hand shall be united in the same son; and a great proportion of students will have occasion to labor on their n farms. A course of study of several years without labor would unfit them actual work, both physically and mentally. We deem it important, too, that bor at these colleges be compulsatory upon all. The idea has been suggested leaving the matter optional with the student, and allowing those who work mpensation. The objection to this is obvious. We desire, as a prominent , to do away with caste, and especially with all distinctions founded upon tion from labor. Interest in the work of the farm can only be main- by constant association of work and study, by constantly testing in the theories of the school-room. The idea that labor is degrading is already ough not designedly) fostered by setting apart, in our ordinary colleges, an ted class, who are not workers, and who from superior education occupy positions. If we would dignify labor, we must combine and associate it ellect and culture of the mind and taste, and in our agricultural colleges no divorce between what God has joined together—the mind and the body. In the agricultural colleges of Michigan and Pennsylvania three hours' daily is required of each student. In the Michigan college, after detailing a nt number to take care of the stock and to attend to minor affairs, the nts are divided into three equal classes, one of which works in the gardens, the charge of the professor of botany and horticulture; while the other work in the field, under the professor of physiology and practical agricul- e. At the end of a certain term the class from the garden is put into the and one of the other classes is put into the gardens, new details being for the care of stock.

At the agricultural college of Pennsylvania the time allotted to labor is the The students labor, however, under the farm superintendent, and not, chigan, under the professors. It seems to us that this is the true sys- It is objected that the professors cannot have time to spend with their n the field; that they need their whole time in their studies and labora- This is the old reason urged in a new form against combining manual and study. The professors of practical agriculture and horticulture, and y, surely should be able to find useful topics of instruction in the field, our battles for the dignity of labor we cannot afford to yield the point so o set apart an aristocracy of intellect in our own professors, by position ducation above manual labor. We need the eye of the master in the We should hardly expect young men to submit patiently to the direction vision of such a man as we are at present likely to employ as farm ent, and there are manifest advantages in having the labor of the ed by their professors—illustrating in the field the lessons of the n, and, with the students, conducting to definite results experiments y vexed questions of practical agriculture.

The only objection to manual labor by students is in the supposed incom- of physical and mental labor. We admit that severe long-continued

daily labor in the field is inconsistent with the close and absorbing purs science and art, but we maintain that two or three hours of the light labo which students of a college would participate may be heathful for body mind.

Mr. Colman, in his reports upon the agriculture of Europe, in speakin manual labor in such schools, says: "There can be no doubt that a man perform more intellectual labor who devotes a portion, and not a small port of every day to healthful physical exertion, than the man who, neglecting exertion, abandons himself in his study exclusively to his books. I am q aware that many occupations of a mechanical or a commercial nature ma occupy the mind as to unfit it for scientific pursuits; but agricultural lal quiet in their nature and carried on in the open air, when pursued with mo ation, so far from fatiguing, refresh and invigorate the mind and prepare i the more successful application to pursuits exclusively intellectual."

IS A FARM NECESSARY?

Whether a farm is a necessary adjunct of an agricultural college, de very much upon whether manual labor by the students is an essential ele of their education, and whether the college is to be connected with anothe stitution or be independent. If we adopt the theory that practice and s cannot profitably be pursued at the same time, we have no occasion for a f Connecticut has granted her land script fund to Yale College, which has e lished a "course in agriculture" in the Sheffield scientific school, which be given at large in this paper.

It is proposed in this place to call attention to two or three points, havi bearing upon the topic under consideration.

The circular says: "The details of farming cannot be learned advantageo in an agricultural school. They are only to be acquired during a long prenticeship on the farm. No young man is well prepared to attend an cultural school who is not practically familiar with most of the ordinary o tions of farming."

To this it may be fairly objected, that it practically excludes from the c all but the sons of farmers, for "the comparatively high standard of admiss prescribed is such as would not be often attained by boys who should be from home into farmers' families to learn practical agriculture. More than half of all the pupils who have thus far attended the agricultural colle Pennsylvania are other than farmers' sons—the most of them from the c and large towns. We apprehend that such will be the case in most of t colleges in the old States, and it is desirable that it should be so. The circul from city to country, from merchandise and the professions to agriculture, in the next generation back to the city, so in accordance with the spirit of institutions, and healthful to the community, promotes harmony and equ and checks all tendency to caste.

Each position in life seems hardest and least desirable to him who fil The city boy sees in agriculture only visions of bliss in the country such has enjoyed there in his holidays, while the farmer's son regards the farm as a place for hard work, and envies the position of the merchant an lawyer. The parents sympathize with these views, and the sons as ofte otherwise seek a different business from that of the fathers. It will n contended that these colleges are designed exclusively for the benefit o sons of farmers, although this is sometimes thoughtlessly assumed.

A college in this country which should not open its doors as readily t sons of the poorest mechanic, the wealthiest merchant, the lawyer, the d and the minister, as to the sons of the farmer, would occupy a positi variance with our common school system and our fundamental principl government.

Whether the details of farming can be advantageously learned in an agricultural school depends upon the appointments of the school, the capacity of the teachers, and the apparatus provided. With an extensive farm, stocked and furnished with specimens of the various breeds of cattle, horses, sheep, and swine, and with such other animals as may be newly introduced, and with the best variety of farm implements—a farm where the ordinary as well as experimental processes of husbandy were conducted, would certainly furnish every facility for learning the details of farming. Whether, as at Yale, the agricultural warehouses and neighboring gardens and farms can, to some extent, supply the place of a farm, must depend much on location. In Michigan and Pennsylvania the agricultural colleges are too far away from any such collections or examples of good husbandry to be aided by them, and we suppose this may be the case in other States. As was said of the labor of students, so it may be said of the farm—it should be regarded as part of the apparatus of the college, and not as a source of profit. The farm that should be chiefly for experiment and educational farming is never pecuniarily profitable, however profitable it may be for education. Experiments which fail, so far as money is concerned, may be as valuable as those which succeed. A beacon or a buoy is often as valuable to the mariner as a compass, and it is as important to the farmer to know what to avoid as what to pursue. A "model farm" is connected with most of the agricultural schools abroad, and the director is required to farm it to a profit; and this is for example to the surrounding farmers, to convince them, by actual observation, that good farming is profitable. This is more important in Ireland or France, where the occupants of land are less intelligent than with us, where each farmer knows pretty well the capacity of his own farm. The objections to it are, that by farming for profit merely we lay aside experiments and pursue the established course of the neighborhood, we must employ the students in what they already best understand, instead of teaching them what they need learn. The idea of a *model* farm is such a farm as may serve for a model for surrounding farmers in its extent, its arrangement of buildings, its live stock, and its course and processes of husbandry. Inasmuch as in most of our States there is so great a variety of soil—wet and dry, clay, sand, and loam—it would be difficult to make any one farm a model for others. But an experimental farm should be of sufficient extent to have a variety of soils, and in its various products illustrate something for the benefit of all the farms of the State.

We have carefully examined the authorities upon the question of the expediency of having land connected with an agricultural college, and this question is closely connected, practically, as we have seen, with that of the independent position of the college, or its connexion with a university.

Mr. Flint, in his report already cited, refers to the latter question, and says that volumes have been written upon it, and that in Germany it is still warmly discussed, the larger party taking ground in favor of a union, and he cites Liebig as among the number.

This controversy is also referred to by Mr. Klippart, in his excellent address before the agricultural convention of Ohio, and he gives a conversation between him and Baron Liebig, in which the baron says: "You want to teach agricultural *science* in the same manner that medical science is taught—that is, by means of lectures delivered by competent professors. You must not trouble yourself about teaching practical agriculture. The several lecturers on the several branches of agriculture can make excursions of one or two days every week, to different parts of the State, and can see and examine the operations on the best farms in the State. In this way they will learn what the present system of practice is with the best farmers; many improvements in the manual part of farming will thus suggest themselves to the students, which they can put into practice themselves. But you must teach the science of agriculture as purely,

that is, with as little reference to application, as the science of geoı y or tri gonometry is taught. * * * But you do want 'experimental statıo Lt the object of these experiments be to obtain the greatest crops at the leaste without impairing the fertility of the soil. * * One centrally locat tution, to teach pure agricultural science, is as much as you need (in Ohio) your population has at least doubled; but if you can afford it, you sho na' an experimental station in each county. * * You will not require a gre amount of land—a few hundred acres is all-sufficient for all manner of expe ments."

The argument of Liebig is evidently not against having experimental fa but against a system of mere model farms, with schools of mere practı agriculture, where science is not taught, but where the processes of culture learned by rote. Further on he is quoted thus: "The agricultural departm to a college, without an experimental station, is simply nonsense. * * T object of an agricultural college is not simply to teach what is already knov but to teach a better system of farming. How will you do this? Certainly ı by employing a practical farmer to manage a model farm for you; for he kno only what is practical generally, and his superior ability will consist simply his better *management* over other ordinary farmers. This will be teaching fi ciering and not agriculture. The only method by which you can possibly adva and develop agriculture, is by experiments; that is the only plan, for there is branch of industry so completely built up by experiments as agriculture. * So far as cattle-breeding is concerned, *all* of that can be taught at the coll proper. A few of each kind of cattle, horses, sheep, and swine will be suffici You must not calculate that the experimental farm will, in any sense, be a sou of revenue to the finances of the institution, for while some experiments n show considerable net profit, others will show a corresponding loss."

It seems quite unnecessary that Americans should enter into the controver which have grown up in Europe. However it may be abroad, there is no stacle to establishing a college in each of the larger States in America, wh shall, in due time, combine all the advantages claimed for both high and l schools in Europe. We assume that, in this country, our college is to be est lished for the admission, not of ignorant laborers or illiterate boys, but of yo who have had the early advantages of good schools, and who are advan enough in common branches to enter intelligently upon courses of scientific st

Although literary colleges already exist, they are not generally so rich libraries, museums, buildings and funds, nor do they so engross the tal and time of scientific teachers that they may not soon be rivalled by new agricultural colleges. To these new colleges may be attached e mental farms, where science may be illustrated and tested by practice, and wh that familiar acquaintance with soils, implements and processes, and with anim their habits, laws of breeding and uses, and that manual dexterity with to may be attained, which cannot otherwise be acquired by those not bred upo farm.

Nearly every agricultural institution in Europe, high or low, has conn with it, in some way, an experimental farm. Hohenheim, the most c agricultural school in the world, has nearly 800 acres in a farm and ab 5,000 acres in forest. Its three independent schools are on the same estate under the same roof, but the different classes cannot meet in the same ro field. The institute is for "young gentlemen," and the school of prac ra ing for the sons of peasants. The latter work nearly all the time, while former are not obliged to labor, though they are instructed (it is said) partly " actual practice."

In France and Ireland, as will be seen, farms are attached to all the of agriculture, and so it is with nearly all those in the Germanic states.

Dr. Hitchcock gives a list of 352 agricultural schools existing in Eur

ıe remarks "with very few exceptions, (I do not recollect any save ity of Edinburg,) a farm of at least a few acres of land is connected ıool." And it may be added, in conclusion, that the opinion of this l of agricultural education is decidedly in favor, not only of inde-ɔı s, but of having connected with them farms of at least 100 or

PLAN FOR HALF-YEAR INSTITUTIONS.

ant of Congress being proportioned to the number of senators and ıtives from the respective States, gives to the smaller States but a d for the maintenance of a college, and such States may prudently hether some modification of a plan adapted to the larger States may eir own case, be expedient. The annual expense of maintaining an ı of high rank as a college in this country is probably not well under-o enable those who are considering the matter of establishing colleges ıe cost more accurately, we give a table by the late lamented president icultural college of Pennsylvania, Dr. Pugh, which, although im-ɔf great interest.

ıwing the educational resources of the more prominent American colleges.

Colleges.	No. of professors.	No. of students.	Amount paid professors and teachers.	Amount of endowment.	Annual expenses.	No. of volumes in library.
ollege	18	181	....	$182,000	....	30,595
College	20	307	$13,000	217,667	$17,907	35,402
ıiversity	56	833	68,000	1,613,884	153,431	149,000
ıllege	17	229	....	590 000	18,500	30,000
versity	12	202	....	220,000	36,000	37,000
e	40	617	....	....	78,000	75,000
College	43	689	52,000	1,650,666	79,269	18,000
city of New York	36	488	....	250,000	14,011	10,000
Free Academy	25	916	42,000	....	52,590	10,000
ge	17	276	19,400	658,000	30,000	18,000
University	11	160	10,950	123,224	13,408	7,000
ıale College	....	......	....	408,000	....	....
College	13	221	....	....	....	22,000
of Pennsylvania	28	642	....	306,654	26,844	8,000
a High School	19	502	....	....	23,430	....
ege	13	400	....	2,000,000	85,000	....
of Michigan	27	286	....	600,000	40,000	8,000
of Illinois	38	......	....	427,625	....	....
ı College	26	225	....	....	36,000	22,000
Iniversity	26	350	....	....	....	25,000

town College has around it 200 acres of ground in a high state of cul-] too, independently of a large vegetable and botanical garden, a l observatory containing many valuable astronomical instruments. anı New Hampshire is but 150,000 acres, which, at the price at ıp ı been sold during the last year in the market, (about eighty e,) would give but $120,000, the interest of which, at six per cent., ı entirely inadequate to pay a corps of professors, even ary, museums, apparatus and furniture were supplied

New Hampshire has in Dartmouth College, at Hanover, in a strictly rura district, an excellent literary college, with a scientific school. The amount o about $18,000 is now annually paid for expenses of all kinds in that institution as appears in the above table. The idea has been suggested, and certainl deserves consideration, whether in that State, where a large majority of th people are engaged in agriculture, and where farmers' sons must form the gı part of the students, a half-year system of study for agricultural students ma not be expedient and best. A majority of the literary students of the colleg are usually away, engaged in teaching the district schools in winter, leavin the professors in comparative leisure.

By connecting the agricultural college with Dartmouth, a few professors the requisite agricultural departments might be added, and agricultural pupi might, during the winter months, attend to lectures and recitations, and summer return to their homes, or find employment wherever they could be practice the theories learned in winter. "Study," (says an officer of Dartmout in a letter now before us discussing this plan,) "say, from November 1 to M 1; then send home the boys, each with half a dozen practical problems abo soils, fertilizers, crops, &c., to be wrought out experimentally, and results not and reported at the beginning of the next term. This would turn the wh State into an agricultural farm, and make all the farmers who had boys he or whose neighbors were thus favored, both teachers and pupils. In the wa months our leading professors could lecture in different parts of the Sta thus diffusing knowledge and awakening interest."

Verily, there is no new thing under the sun, and we find that the plan half-year instruction is already in operation in Europe, although with wl prospects of success we are unable to learn. From the report of Mr. Fli already cited, we select the following account of a school upon this system.

GEISBERG.

The agricultural institute at Geisberg, near Wiesbaden, is the princial if the only one of the kind in the Duchy of Nassau. This school differs fr most others, in giving instruction only in winter. It is on the isolated a independent plan, and is designed for the instruction of practical farm without teaching practice on the place. Applicants must be sixteen years c possess a good elementary education and a good character, and it is expec that they shall have spent one or more summers in work on the farm bef they enter. "Each pupil is required to attend all the lectures; but they ha a class of pupils who take only a partial course. The theoretical instruct is given in a regular course of two winters, the term beginning on the 15th October of each year, and ending on the 31st of March. During the interv ing summer the pupils are either at home, at work on the farm, or, if tl desire it, the director of the institute procures them suitable places with ski practical farmers.

"The instruction is by lectures and written and verbal questions on studies. After the return of the students from their summer's work on the fa they are required, within six weeks, to present a full written detail of op tions, which, after suitable corrections, is returned to the writer. The instit possesses a library, which appeared to be tolerably well stocked, very good col tions, and five lecture and study rooms. It was founded in 1835, and as n be inferred, from what has been said above, on the principle that it is of no to try to teach theory and practice at the same school. There is a small f connected with the school, but judging from the helter-skelter, or gener mixed up condition of everything about the premises, I should think they w quite right in not attempting to teach practice there. Old ploughs, drags, ca harrows, and everything else lay around the building in no small confusion.

farm buildings are irregular and crowded, not large or imposing, but rather ordinary in every respect, though the building used by the students, and for the collections, was better. These collections consist of minerals, birds quadrupeds, seeds, grains and grasses, and a fine collection of wax fruits. The instruction embraces in the first or winter term the German language, arithmetic, botany, mineralogy, physics, general agriculture, cultivation of meadows, rural architecture, and veterinary science. In the second winter the boys take up zoology, physics, farm accounts, special agriculture, special zootechny, horticulture, technology, veterinary medicine, and composition. The director had left for Hamburg, so that I was obliged to find my way about without much assistance."

These colleges are, of course, to be organized to suit the great variety of climate and soil, and the different habits and systems of education prevailing in an extensive and diversified country.

In Michigan and Pennsylvania colleges, which have extensive farms attached, it is found convenient to have a vacation of about three months in winter, that being a leisure season on the farm, and practical agriculture being deemed the most essential element of the system.

Where no farm is attached, but pupils are expected to have resided on a farm before admission, and to return and labor on the farm in summer, there seems to be no objection to reversing this order, and devoting the winter half year entirely to study, and the summer to practice. And, again, it may be found convenient to combine the two systems to greater or less extent; to have a small experimental farm attached to the college, and to devote the winter chiefly to study in theoretical science, and allow pupils the choice to remain and devote themselves mainly to practical pursuits in summer upon the farm, or to go home or elsewhere, and earn by their labor the means of paying for their college education.

In the northern and eastern colleges many, perhaps the majority, of the students are in moderate circumstances, and are compelled to use strict economy to acquire education at all; many of them teach in winter, and some of them find labor to perform nights and mornings. We know one worthy young man who was a conductor of a street car between Cambridge and Boston certain hours of the day, during a year or more of his course in Harvard University, and lost no position with his class-mates by so doing; and many are glad of any employment to aid them to obtain a college degree.

This spirit is to be encouraged by every possible means, and if by the half-year system, or by furnishing compensated labor on the farm to students of small means, we can help them to acquire a good education, we shall do a substantial good to the country.

To make labor honorable, and to enable the industrial classes to gain by education the equality which is the birthright of Americans, is the special mission of those entrusted with the organization of agricultural colleges under the grant of Congress.

AGRICULTURAL COLLEGES IN EUROPE.

When we consider the differences between a republican and an aristocratic government, we should hardly expect to find in any European state a model for an agricultural college suited to our wants. We propose to organize colleges open to all classes alike, where the children of rich and poor, of laborers, mechanics, farmers, lawyers, doctors, merchants, and ministers, shall come up from our common schools, enter the same classes, labor side by side in the field, enjoy equal privileges, and know no distinctions on account of birth, or wealth, or rank in society. Such an institution could not exist in any aristocratic country. The very fundamental principle of their government is that of inequality or caste—that a few are born of higher rank, of better blood than

the mass of the people, and that to these belong the powers of gove the wealth, the honors, the luxuries; while to the middle class belong trad manufacture, the care of land as tenant farmers, with some restricted to suffrage; and to the vastly more numerous third class of laborers is assi hard work, ignorance and poverty, with no participation in the government, an no hope of rising above the humble position to which they were born. Thes divisions into classes are by no means merely theoretical; indeed, they exis more distinctly, if possible, in fact than in theory.

Not only is society in nearly all countries in Europe divided into grades c classes, ranged in the social scale one above another; but strict laws, or custom having the force of law, generally prevail, which limit and confine all citizen and mechanics to their own particular trades. Before being allowed to pu a trade the youth must serve a five or seven years' apprenticeship; and ha learned it, he is limited strictly to his labor in it, and must starve if he cann find employment in his own special department, although another, in which skill would enable him to work successfully, may offer abundant oppor With us, a man may be a farmer in summer, a shoemaker or black in winter, and change his trade as often as he pleases. A glance at our Congre and list of Presidents will show, indeed, that no employment, however humbl is too low for a stepping-stone for honest ambition, with persistent industry, attain the loftiest positions of honor and power.

ENGLAND.

In England society may, so far as relates to agriculture, be divided into thr classes: the landlord, who is usually a nobleman and owner of some thous of acres of land, occupying himself but a small portion of it; the far who is his tenant, hiring the land for a money rent; and the laborer, who employed by the day or year, or by piece-work, and who performs all the ac hard work.

The nobleman, or land-owner, is a gentleman of fortune, living on his ma cent estate, a man of culture, of refined taste, of political position, born to condition as a member of the aristocratic, governing class. The tenant farm is usually much such a man as a substantial New England farmer. He has a go education for his business, which is to manage his farm of 500 or 1,000 acres a regular system of rotation, with very little change; to buy the seeds, ma cattle, sheep and implements for his farm, and sell his wheat, barley, wool a other products; keep regular and careful accounts, and pay his rent prompt He lives well, labors but little with his own hands, oversees his laborers sharp and pays them their small wages fairly, and is, on the whole, a tolerably co fortable, independent man. He manages to educate his children at priv schools with others of his class, and his daughters are often teachers or gove esses in the families of the nobility. The laborer is usually poor and uneducat He lives in a mean cottage. His children generally hardly learn to read write. His wages are from $2 25 to $3 50 a week, and on this amount boards himself, and often goes two or three miles, and back, daily to his lab His children are compelled to labor at a very early age. He has no hope improving his condition, and the almshouse in the distance is the refuge of old age.

The nobleman and the farmer never, in public or in private, associate on eq terms. They do not visit each other's families. They never sit at the sa table. Their children do not attend the same schools. Between the farmer a laborer the chasm is still wider—almost, if not quite, as wide as between m and slave. Their children do not associate, and of course they have no scho where they are educated together; for, as has been said, the children of borer are without education.

re taken England as an example, because England is the foremost Europe in her agriculture, and the nation to which we naturally look les. It will be seen at once that such a college as we demand can lace in England. A college there must be for one class or another, asses cannot and do not mingle. Indeed, so long as the different maintained, they require different education, and of course different An English nobleman has no occasion to learn to plough and sow, and reap, with his own hands; because he will never have occasion to r even direct such labor. He has always a steward or bailiff, who ds the estate, and personally directs its improvements and cultivation. laborer, as we have seen, has no occasion for a college of any kind. education to admit him to its classes, no time to attend, no money to im there.

y agricultural college existing in England at present is that at Ciren- rofessor Hitchcock visited it in 1850, and in his excellent report gives ant of it: "The buildings are substantial, ample and even elegant, the front being 190 feet. They include a dining-hall, library, museum, m, theatre, laboratories, class-rooms, private studies, kitchen and ser- ns, and offices, with dormitories, one for each student. An elegant just been built; a forge, a carpenter's and wheelwright's shop are s also a dairy and slaughter-house." The farm consists of 700 acres, are accommodations for 200 students.

owing language of Professor Hitchcock is worthy of special notice in with our idea that aristocratic countries cannot furnish models for this 'Formerly the school was open for the sons of the smaller farmers, not find support on that plan, and it was found that if these attended ier classes would not send their sons. The price, accordingly, has l, and none but the sons of gentlemen, such as clergymen and wealthy w attend. None of the nobility send their children, although many money for its support"

t, secretary of the Massachusetts board of agriculture, visited the agri- llege of Cirencester in 1863, and his account serves to confirm the derived from Professor Hitchcock's report, that no scheme can be adapt such an institution to the social and political condition of Eng- is institution, he says, does not appear to have commended itself very the confidence and good will of the people, and hence it has proved tial, not to say a complete failure. It has now a debt of £30,000, 0, which is a source of great embarrassment, in addition to the various s of ill success, which need not be stated in detail here. When I was in 1862, all the professors resigned their positions, and most of them, eft, one or two only having been persuaded to hold on, to save the from utter ruin."

time the institution was still in operation, with about sixty students, rich. Mr. Flint concludes his notice of this institution as follows: t of caste, so prevalent in England, has probably been the cause of of this college to meet the expectations of the friends of agriculture, nd itself to any considerable portion of the people. I could not t was popular with any class. They are waiting for something to but in the mean time an enormous debt hangs like an incubus upon . Its future is therefore doubtful."

then, that England has not, and probably never can have, an agri- lege such as we seek to establish. Yet we know that England is ltivated country in the world, unless, on the authority of Liebig, we Her average crop of wheat is estimated at twenty-eight bushels ile that of France is less than fourteen bushels. Yet France is r for wheat, both in soil and climate, than England. So said

Arthur Young, the celebrated English agriculturist, in 1789, and so says La-vergne, the highest French authority, in 1855; and wheat is the great staple of both countries, and its cultivation is encouraged by both to the utmost.

How, without agricultural schools, does England so much excel in agriculture? and why may not other nations arrive at the same state of excellence by the same means?

These questions are pertinent and should be fairly met. In the first place, England is an old country, and her system of agriculture is limited (perhaps necessarily, from her cool, moist climate) to a few crops in a regular rotation, established by long experience. Her crops are wheat, turnips, grass, and barley, and her live stock sheep and cattle. Her system of husbandry is simple and well established, and therefore easily managed compared with our own which is growing up over a continent of new land of the greatest diversity o soil, and great variety of products. The hot, dry, tropical summer of America even of New England, admits of the culture of several important crops whicl cannot grow in England, of which Indian corn and tobacco are the chief.

Again—and this is essential—the soil of England is owned by but few persons and it is leased in farms of from one hundred to one thousand acres to intelli gent farmers. Although the laborers are degraded and ignorant, those who di rect them are competent and well informed, and employ large capital in thei business. Skill and capital are the secrets of British husbandry. A thousand acre farm in Lincolnshire requires fifty thousand dollars capital to conduct i profitably. The farmer spends nothing for land, but everything to cultivate it There can be no doubt that a thousand acres of arable land may be more pr ably cultivated under the charge of one intelligent man, with steam engines an all other machinery adapted to his wants, who shall systematically drain, divide and suitably crop in rotation the various fields—who shall buy his seed, stock and manures at wholesale, and be able to hold his products for a fair price, tha it would be if divided into a hundred ten-acre farms, each managed as a sma owner must manage it.

The processes of English husbandry are more perfect than those of other na tions. Their ploughing is better, because the same man holds the plough in on long furrow from the cradle to the grave, and knows how to do nothing e This division of labor, which is possible only on large estates, tends to p x tion in mere manual labor.

If the whole object of government were to produce the most food on a give area, perhaps the English system, which makes one man the head and man others the hands, is the best. We have high authority, however, for sayin that man cannot "live by bread alone;" and there are higher objects of govern ment than to produce corn, though that is essential. Hence, if an enjoyment (equal rights, under a republican government, makes our crops less per acre tha under a monarchy, we should by no means be tempted to sell our birth-righ Let our ambition be to unite head and hand in the same labor; to give educatio and free scope to all to improve their condition; consign no millions to ignoranc and hard work for the production of an abundance which they do not shar and let superior intelligence in the whole people compensate for the doubtful ac vantages, in aristocratic countries, derived from the concentration of capital land in the hands of a few.

IRELAND.

By way of compensation, perhaps, to Ireland for holding her as a provir and depriving her of her nationality, England has undertaken to provide that unhappy country a system of education far more complete than has e been established in England itself. Whether the result of education in Ire ll be an increase of Fenianism, or a more prevailing spirit of humility a

e in its subordinate position, is a question which chiefly concerns Great

missioners of national education have established in Ireland an exstem, consisting of four classes of agricultural schools, under the name schools, ordinary schools, school-gardens, and work-house schools; the f which existing at the close of the year 1857, when the writer visited was, model, 38; ordinary, 48; school-gardens, 3; work-house, 76; total of 165. The number had not increased in 1859, and probably bout the same.

lbert National Agricultural Training Institution is situated at Glasout three miles from Dublin, in Ireland. It was established by the mers in 1838, and stands at the head of the agricultural schools of It is designed to supply such instruction, both in the science tice of agriculture, as will qualify young men for becoming farmers, rards, and teachers. The buildings, which are plain but substantial, dormitories, dining-hall, lecture and school rooms for seventy-five pupils, with a museum, library, and laboratory, a comprehensive range offices, and apartments for the superintendent, matron, land-steward, and servants.

visit in 1857 the library, museum, and apparatus for illustration in all of science were inferior to what we find in an ordinary high school chusetts, and we learn that the same is practically true still. The istruction of the institution is all conducted by two teachers. Two pupils attend: 1. Externs, or non-residents, board and lodge at their nse, and are admitted on payment of a fee of two guineas. No regis set apart for the training of this class. They are engaged in all cal operations of the farm, and their education is chiefly in strictly agriculture. The other class, called Interns, consists of two divie first, of those who intend to be farmers and land stewards; the f those who are qualifying themselves for teachers of agricultural Both divisions of this class are boarded and lodged at the public They must be of sound health, good character, and seventeen years

1860 the pupils are admitted on a competitive examination. They ble to read correctly, write a legible hand with facility, possess such e of grammar as to be able to parse short and easy sentences in prose, geography to give the general outlines of the map of the world, the s, countries, and chief towns and rivers of Ireland. They must know f arithmetic to work easy questions in fractions and simple proporunderstand the first book of Euclid, and enough of book-keeping to nature and use of a cash account, and other simple forms. The training is two years for the land stewards and farmers, and one year he teachers. The institution is organized as follows: 1, a superin-Dr. Kirkpatrick, who has general charge; 2, a matron; 3, an agriwho resides on the farm, and carries out the practical working of it, superintendent; 4, a gardener, who has charge of the horticultural de-; 5, one or two literary teachers. There are, in addition, non-resident who lecture on—1, animal physiology and pathology, and the treatment s of domestic animals; 2, botany and vegetable physiology in their to agriculture; 3, chemistry and geology; 4, agriculture; 5, horti-Each lecturer gives two courses of lectures in the year, which is two sessions. The course of instruction by the literary teachers English grammar and composition, arithmetic, book-keeping, and ics, including land surveying, levelling, and mapping. All the are required to take part in the performance of every kind of farm ng the feeding and management of live stock. They are made

practically acquainted with the most recent application of steam pov agriculture, and with the uses of the best farm implements.

The farm consists of about 180 statute acres, of which about ten gardens and pleasure grounds, the rest being under farm cultivation. fifty acres are set apart for a model farm, which is under the highest tion, and pays a profit beyond the rent. The following five-course rota carried out on this farm: 1st year, turnips, mangel wurzel, and carrot potatoes, winter beans, and cabbages; 3d and 4th, Italian rye-grass oats.

The remainder of the estate is in what is called "the large farm," of 145 acres. On the large farm wheat and barley came into the rotations, are arranged for three different courses of three, four, and five years. order of succession of the crops in the three years' course is, first year, crops, manured; second year, grain, with Italian rye, grass, and clover; year, grass. In the four years' course, usually called the "Norfolk shif crops succeed in this order: first year, green crops, manured; second year, with grass seed; third year, grass; fourth year, oats. The five years' differs from the last only in leaving the grass unbroken another year, th and fourth years being grass. All the crops on this estate indicate that cal agriculture is thoroughly understood. Their average crops in 185 and '55, were, of wheat, 32⅝ bushels to the acre; of barley, 39½ b oats, 70 bushels; of potatoes, 373 bushels. Their average product or wurzel has usually been thirty tons (of 2,240 pounds) to the acre.

So remarkable seemed to us the crop of mangels upon the ground, at t of our visit, that we requested the superintendent to send us a statement mode of cultivating it on their farm. A few months after, we were su to receive, in America, a printed treatise on the subject, by a pupil of the Institution, with a statement appended, that a prize had been offered for tl treatise by a pupil in the school; that several had been prepared and sub to competent judges, and the prize awarded to the one which was sent. published and largely circulated by the Chemico-Agricultural Society of I and in this country it was published in the Transactions of The Massacl Society for Promoting Agriculture, and also in pamphlet form for distril The judges were in doubt which of four competitors was entitled to the and this fact, with the acknowledged value of the essay, speaks highly character of the Albert Training Institution.

The model agricultural schools of Ireland have small farms attached, a usually under the charge of a schoolmaster and an agriculturist, who gi pupils instruction to fit them for farmers, land stewards, or teachers, them constantly practical instruction in all the operations of the farm. pupil at each school is supported by the commission; the others pay a sum for tuition and for their board. When the course of study in these is completed, those who have distinguished themselves are allowed to go Albert Training Institution, there to complete their course free of ex About half these schools are under the exclusive management of the c sioners; the rest under local patrons.

The ordinary agricultural schools are ordinary schools with land at where the pupils are taught practical agriculture.

The workhouse schools are for the instruction of paupers; and althou doubt valuable in their way, neither they nor the ordinaries are within th of the present paper.

FRANCE.

By an act of the national assembly of France, in 1848, a system of a tural schools was established throughout the kingdom. They were of classes, or grades, and are clearly described by Dr. Hitchcock, from

aluable report is condensed the following account. They are, beginning with he lowest, the Farm Schools, the Regional Schools, and the National Agroomic Institute.

1. *Farm schools.*—These are schools where children of laborers are received rithout charge, performing all the labor on the farm, and receiving, as a reunneration therefor, instruction in agriculture, essentially practical. They are stablished for two objects: first, to furnish good examples of tillage to the irmers of the district; secondly, to form agriculturists capable of intelligent ultivation, either upon their own property or that of others, as farmers, tenants, r managers, or to become good assistants, or farm servants, leaders of manual ibor, or overseers of cattle and horses. They are established in most of the igbty-six departments of France, near the centre, and where the soil is similar) the general condition of the region. They have annexed to them gardens, urseries, and collections of fruit trees. The buildings for the schools are contructed in a plain and substantial manner, conforming, in general, to the characr of the buildings in the district. The director is chosen, of preference, from m ng the farmers or proprietors of the district whose farms are conducted in e best manner. The instruction is, as far as may be, practical, and given ven in the field where the pupils labor, in the stables, and in the sheep-fold.

The officers and their salaries are—a director, salary $412; farmer, $184; verseer of accounts, who teaches the mode of keeping farm accounts, condered in Europe a most important part of agricultural education, $184; a ursery gardener, $184; a veterinary surgeon, $92; and some other leaders, rding to locality, such as shepherds, silk-growers, irrigators, &c.

The school is open to young men from country families, sixteen years of age, e received education in the primary school, and who have a good contion. The numbers attending vary from twenty-four to thirty-two pupils. ney all work, like laborers, for wages. Three in each school are confined to gardens and nurseries, so as to become gardeners. The number should be cient to carry on all the operations of the farm, which is an essential feature this sort of school. They receive board and instruction gratuitously in rem. The farms vary in extent from 200 to 2,000 acres. The first year they d to simple manual labor; the second year they have charge of the animals; e third year they have the oversight of various operations. The hours approiated to study are devoted—1, to the arrangement of the notes the pupils have ten during the instruction from the different leaders; 2, to reading a manual book of elementary agriculture; 3, to lessons given by the overseer of acon the elements of arithmetic, book-keeping, surveying, &c. The time voted to study is less in summer than winter.

les paying the board of the pupil, the government allows each one $14 for clothing. Prizes are awarded for good conduct, and a single prize of $100 is awarded to the pupil most deserving at the end of the three years' e. He who leaves the school, or is dismissed, loses all prizes.

The director works the farm at his own risk. He is obliged so to conduct it to afford the best means of instruction to the pupils; to submit his books and ts, at any time, to the examination of government; to send annually to ster a full account of the state of the school, and to publish a full aceach year, of his operations, of his success, or his failure. If it appears the farm is not conducted so as to afford a net produce, comparatively with other farms of the region, the patronage of the government is with-

2. *Regional schools.*—These have three objects: 1. To form enlightened urists, by teaching them the principles of agriculture. 2. To offer an or model of practical agriculture of a high and advancing order. 3. experiments for improving the cultivation of the soil. The instruce schools is of a much higher grade than in the farm schools, and is

adapted, not to prepare laborers on the farm so much as men to direct agri tural affairs.

The farm, containing from 750 to 2,000 acres, connected with the school, expected to present an enlightened system of culture, and to adapt that cul to the wants and peculiarities of the district in which it is situated. The dire tory is not, as in the farm schools, a farmer or proprietor, laboring at his ow risk, but an agent employed by the government, and accountable to it, subject to its direction.

The instruction is both theoretical and practical, embracing the following s professorships:

1. Of rural economy and legislation. 2. Of agriculture. 3. Of zootechn or the economy of animals. 4. Of sylviculture (cultivation of forest trees) a botany. 5. Of chemistry, physics, and geology applied to agriculture. 6. rural engineering, including irrigation, construction, and surveying.

Each school has its library, its philosophical and chemical cabinet, adapt especially to agriculture, its museum of geology, zoology, botany, and ag cultural technology.

The pupils have an opportunity of witnessing, on the farms connected those schools, all the important agricultural operations; also, of seeing speci of the best breeds of animals, and the mode of using and taking care of th and they engage personally in all the important operations of husbandry. state furnishes several scholarships to each school. Half of them are given the most deserving of the pupils from the farm schools, placed at the regi schools. The other half are divided among the scholars who are the most d tinguished, after six months, for their labor and conduct. Towards the close of t third year examinations are held, and to those who sustain themselves dipl are given, and the way is opened for their admittance to the national institu

In addition to the farm, there is attached to these schools a manufactory agricultural implements, a silk establishment, a distillery, oil-mill, saw-m dairy, and other departments.

In the report of Mr. Flint, in the Transactions of the Board of Agriculture Massachusetts for 1863, may be found a very full account of one of th schools, which, the writer says, are now known by the name of imperial scho of agriculture, of which there were in France but three at that time; the at Grignon, usually having about seventy-five students, being the most flou ing, and being the one visited and described by him.

3. *The National Agronomic Institute.*—This institution was located at V sailles by the act of 1848, and we find no later description of its organizat than that given by Dr. Hitchcock. Three farms, a garden, and a forest, bracing about 3,452 acres, have been devoted to it. It presents itself in a fold aspect: first, as having a faculty of the agronomic sciences; secondly, a superior normal school of agriculture; thirdly, as a higher institute for agi tural education, open to the administrators and proprietors who have tur their attention to agriculture. To meet the wants of this class especially large farm is connected with the school. Here will be performed, at the pense of the state, all the experiments necessary to the progress of agror science, and to verify, practically, all the innovations and improvements p posed by others, before they are recommended to the public. This, says Hitchcock, is an object of great importance, and should enter into any plan a school in the United States. This institute differs very little in its org tion from the regional schools, except that it is on a more extended scale, the course of study is more elevated.

GERMANY.

The German states furnish the oldest, and, no doubt, the best existing s tems of agricultural education in Europe. We have already spoken of s

the most ancient of their schools, and are indebted to an excellent address by Mr. Klippart, secretary of the Ohio board of agriculture, for the following account of late institutions:

"In 1811 a private forestry school was established at Tharandt, in Saxony, which, in 1816, was transferred to the state authorities, and in 1830 was converted into an agricultural college. In 1818 the great agricultural college of Europe was established at Hohenheim, in the neighborhood of Stuttgard, in the kingdom of Wurtemberg. Then, in 1835, an agricultural college was established at Eldena, in Pomerania, in Prussia. * * * Its importance once appreciated, it is somewhat remarkable how rapidly agricultural education has grown into favor with the Germanic tribes. There are at present no less than 144 agricultural stations, institutes, schools and colleges in the Germanic states; and all of them, with the exception of the three already named, were established since Liebig published his first work on agricultural chemistry, in 1844, or during the past twenty years. These are located as follows: In Prussia 51; Wurtemberg 6; Bavaria 12; Saxony 4; Grand Duchy of Baden 6; several duchies 28."

Many of these are institutions for training laborers or teachers in special departments, as shepherds, foresters, gardeners; many of them specially to teach the culture of flax; some the care of meadows and irrigation; but the greater part are schools of practical agriculture, where the lower classes are educated to labor, and to fill the positions of land stewards or managers of estates for the higher classes.

As it is desirable to give in full a few examples of the best institutions at home and abroad, with the course of study and general scheme of organization, we will give, in the language of Mr. Klippart, with some omissions, an account of the institution at Hohenheim.

Hohenheim being not only the oldest institution of this kind now in existence, but the most famous one, I have deemed it proper to place it first on the list. It was established on the 26th of May, 1818, and had at that time an estate of two hundred and fifty acres of cleared lands, and was placed under the direc- of Baron Nepomuk Schwerz, a very celebrated agronomist, and at that time ne 60th year of his age.

The institution was opened on the 20th of November, 1818, with eight students. The buildings were erected on the ruins of an old castle, by Duke Charles, in 1770–80, as a princely residence for himself and body-guard; and se structures were almost in ruins themselves, when King William deter- l to establish an agricultural college there. A portion of the royal stud flock of sheep were placed under the direction of the institution in 1822. I e taken some pains to obtain these dates, in order to place upon record the , that only during the past fifty years have any steps been taken, whether right or wrong direction, to teach the science of agriculture in its various ches, so far as they were known, in the most populous, enlightened, and ilized portion of Europe.

The institution of Hohenheim consists of three separate schools, namely, that h may be termed the higher institution, the agricultural school, and the icultural school, and to these may be added several special courses o. study instruction which, nevertheless, have an agricultural relation.

The higher institution was changed into an academy in 1847. Students were ceived in this academy who were not less than 18 years of age, that have e the requisite proficiency in preparatory studies, and who desire to obtain wledge of agriculture in all its branches and relations, so that at a future they may manage their own estates, or undertake the management of large others. Instruction is imparted by lectures and practical demonstra- 1 the course embraces two years of time.

The agricultural school is independent of the academy, and was instituted

for the purpose of creating a class of thoroughly practical stewards, or ov of small estates, who will take the plough in their own hands. At prese devoted more to teach young men, who own small estates, how to perfo necessary agricultural operation with their own hands. As their pr cation is the main object, the greater portion of their time is spent in labor on the farm. They, however, receive instruction from professors two hours each day in the lecture room. The number for any one term ited to twenty-five, and they must be residents of Wurtemberg—no for are, under any circumstances, admitted to this school. The course en three years; they must be at least sixteen years of age, and must have paratory education.

The third school was established in 1844, and is named the hortic school. Six students are annually admitted for a year's theoretico-p course of instruction. The requisites to enter the school are: To be sev years of age, to have served a three years' apprenticeship in gard n the vineyard, or, in lieu of that, to have gone through one course in cultural school. The object of this school is to complete both the the and practical education of gardening and horticulture, which the studen have attained in the other schools.

In addition to these three schools, there is annually an educational co fruit-growing, meadow culture and management, shepherding and school-te

The fruit-growers' course has been held annually since 1850. The st are young men of eighteen (and upwards) years of age, who intend t fruit-growing their occupation. The course is embraced in four or five study in the spring, and a few days in summer, to learn inoculation prac Of late years, however, so many wish to attend this special course that been commenced about the middle of March and terminated at the end o thus giving an entire course to three successive classes. The meadow course of lectures was commenced in 1844, and suspended in 1852, bu restored in 1855. It is a five weeks' course in the spring time, and co lectures on practical drainage, surveying, &c., for those who wish to becc gineers in agricultural operations, such as drainage, irrigation, &c. Th ber in attendance has averaged eight since the commencement. The she course was established in 1855, and has had a regular annual class of twelve. The requisites to enter this class are: To be twenty years of a to have served an apprenticeship of at least four years in the shepherd e tion. This course commences in February and continues four weeks.

The school-teachers' course is somewhat similar to our normal school s and the object of it is to introduce elementary agricultural knowledge common schools. The course is limited to three weeks, and is held duri autumn; the number of cadets is limited to twenty-five.

The instruction in these extraordinary courses is given either by pro of the institution or by experts in the respective specialties who are enga the directory to deliver the special lectures.

From 1840 to 1846 a course of lectures was annually delivered on th vation and preparation of flax, but was discontinued when an institutic opened in Stuttgard "for the promotion of flax industry." Since 1852 t ous workshops, pattern and model depositories, and the various mus open to master mechanics, who are permitted to remain ten days in the i tion, to observe, inquire, make notes, drawings, &c., of the models or ot provements there; seventy-seven master blacksmiths and fifty-eight wagon-makers have given testimonials of the acquirements they e their ten days' sojourn. In addition to all these, there are special c government officers, or those who will succeed in hereditary offices. A se has also been adopted for instruction in bee and silk-worm cult ent.

THE MODEL FARM.

el farm consists of about 1,000 morgen (778 acres.) The director ;ne idea that it is a model farm, in the usually accepted sense of that intended to demonstrate improvements, such as a rational system of ɪɪ crops, careful and thorough culture of the soil, proper treatment of under draining, irrigation, &c. Of these 1,000 morgen, 835 only are ual arable condition, as follows :

ussefield rotation	99	morgen.
refield rotation	232	"
lefield rotation	278	"
iculture	19	"
	145	"
pastures	50	"
	3	"
ood nursery	9	"
	835	morgen.

re stock employed and kept upon this farm are: 10 farm horses; 90 cows ; 28 work oxen, and 1,000 sheep. The remaining 165 morgen are de- experiments, demonstrations, &c., such as a botanical garden, experi- lots, vegetable garden, vineyard, and a nursery for agricultural and ıral purposes.

cperimental fields are composed of ninety-seven plots of ground, each g one-fourth of a morgen. On these plots all manner of experiments —such as experiments in the different depths of ploughing; the effect of manures; the effects of different systems of rotation of crops; the effects :ession, for a series of years, of the same kind of crop, (as wheat, rape es, &c.;) the effects of excessive manuring, thick and thin seeding, ınd broadcast sowing. Then, too, in these fields rare and valuable seeds n for distribution among the farmers. When I visited there these ex- al fields were chiefly occupied with cereals—wheat, rye, barley and oats— ı ; were occupied with potatoes, rape, lupines, peas, beans, poppies, swedes, sugar beets, carrots and sorgho.

ε tment for applied chemistry consists of a sugar-beet factory, brew- liery, starch factory, vinegar factory, a malting and fruit-drying estab- roof and drain tile manufactory, &c.

i ltural implement and machine manufactory was established, not pıy the vicinity with the best implements and machines at the low- ıe rates, but as a school where young men might become practically workmen. It employs from thirty to forty workmen, of which, two or exclusively engaged in manufacturing models of agricultural machines ements.

ı silk-worm de tment everything is taught that is known in this f industry, n ıy, how to rear and manage silk-worms; how to reel , and pre e the silk for weaving or sewing.

:-pr ri aepartment is still continued, but is limited to water-retting ..d scutching it during the winter; and its only object now ɔı une Netherland system of preparing flax into Wurtemberg.

ı ad a this model farm, is an establishment for the dissemi- se ı fan s in the kingdom. There are annually distributed a u and ten Then, too, there is an annual sale of bulls and ɔ ɔı and sheep. I have omitted to mention any- e to ry de nt. The forest consists of 6,290 morgens, all of inaigen s trees, shrubs and plants, and a plot of

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PLAN OF TEACHING AND BRANCHES TAUGHT.

The instruction in the academy is imparted partly by lectures, partl demonstrations and excursions, and partly by actual practice. The follo is the plan and course of lectures:

I.—AGRICULTURE.

A.—Agricultural Products.

1. General agriculture and plant culture.
2. Special plant culture.
3. Meadow culture.
4. Grape, hop, and tobacco culture.
5. Fruit culture.
6. Culture of vegetables, (kitchen,) breeding of domestic animals.
7. Horse breeding.
8. Cattle breeding.
9. Sheep breeding.
10. Breeding small animals.
11. Silk-worm culture.
12. Bee culture.

B.—Professional.

13. Taxation.
14. Book-keeping.

C.—Agricultural Technology.

II.—FORESTRY.

Encyclopedia of forest science.

Agricultural Encyclopedia for fore

A.—Forest Productions.

1. Forest botany.
2. Growing woodlands.
3. Protection of forests.
4. Profits of technology of for

B.—Forest Economy.

5. Forestry.
6. Forest taxation.

C.—State Forestry.

7. Wurtemberg forest laws.
8. Practical forest business.

III.—COLLATERAL BRANCHES.

A.—Mathematical Collaterals.

1. Arithmetic.
2. Algebra.
3. Planeometry.
4. Stereometry.
5. Trigonometry.
6. Practical geometry.
7. Valuation of forests.

B.—Natural Science Collaterals.

8. Mechanics.
9. Physics.
10. General chemistry.
11. Agricultural chemistry.
12. Analytical chemistry.
13. Introduction of geognosy.
14. Geognosy.
15. Special botany.
16. Vegetable physiology.
17. General zoology.
18. Special zoology.
19. Veterinary science.

C.—Political Economy Collaterals.

20. National economy.
21. Principles of law.

D.—Technological Collaterals.

. Economical architecture.

23. Draughting plans.

The above named general subjects may be considered as though each subject named were the title of a good sized volume. The captions or titles of the lectures themselves occupy about twenty-five large pages of finely printed matter. For instance, the subject of general agriculture and plant culture is divided into ten sections, as follows: 1. Introduction; 2. Climate and meteorology; 3. The soil; 4. Agricultural implements and machines; 5. Preparation of the soil; 6. The increase of plants; 7. Manures; 8. Protection of the seed when sown; 9. Harvesting; 10. Preservation of agricultural products.

Each one of these sections is divided into specific subjects, and each of these specific subjects into lectures. As an illustration, the second section (on climate and meteorology) is divided into the following specific subjects, each one of which may be the theme of a lecture, namely: 1. The atmosphere—its composition, height, or pressure; 2. Moisture, dew, fog, clouds, rain, snow, hail; 3. Winds; 4. Electricity and lightning; 6. Heat, or warmth—its horizontal, perpendicular, and curved distributions; 7. Light, and its influence upon vegetation; 8. The heavens, stars, moon, and comets; 9. Local climate; climate as affected by seas and continents; elevations above the level of the sea; influence of large streams, seas, sandy plains, prairies, forests, mountains, valleys; 10. Inherent warmth of the earth and terrestrial magnetism; 11. Distribution of the vegetable kingdom; 12. Effects of frost; 13. Duration of vegetation, and amount of heat during that period; 14. Acclimatization of plants.

Here there are fourteen lectures on one special subject. Taking this as a specimen, there would be 140 lectures upon the subject of general agriculture and plant culture, before the subject would be considered exhausted, and, perhaps, before a lecture would be delivered upon special plant culture, or meadow culture. And so on with the others.

The institution has a library of 4,000 standard volumes, and an annual fund of 500 florins ($200) to increase the library. There are cabinets and museums of everything pertaining to the branches taught; a collection of soils, minerals, plants, woods, wools, fibres; a museum of anatomy and physiology; a vast collection of models of implements, machinery, &c. This last collection embraces 1,250 articles; among them are models of 110 ploughs. In the museum of natural history I saw stuffed specimens of 400 different birds, and 100 mammals, besides many reptiles and fishes. In the veterinary department is a very extensive collection of pathological specimens and preparations.

The aggregate number of students inscribed on the books of the academy, from its commencement until the termination of the winter course for 1861–'2, was 2,944; of these 2,322 entered for purely agricultural studies, and 622 for forestry. Thirteen professors are employed.

AGRICULTURAL COLLEGES IN THE UNITED STATES.

MICHIGAN.

' State Agricultural College of Michigan was established by an act of the ture of February 12, 1855, which authorized the president and executive ttee of the State Agricultural Society to select, subject to the approval of board of education, a site for an agricultural school within ten miles of ansing. During the same year the farm of 676 acres, then covered with heavy rest, was selected, and a boarding-house 43 by 82 feet, three stories, with a ement; a college building 50 by 100 feet, of the same height; four houses r professors, all of brick, and a stable, were erected. On the 13th of May, 157, the college went into operation, and has continued in operation to the eent time.

As this is the oldest institution of the kind now in existence in this country, possesses every apparent element of prosperity and usefulness, its progress

must be watched with interest by all who are engaged in organizing agricultural colleges.

In a visit to this college, in the summer of 1865, we had the opportunity of examining the details of its operations, and we find in its present condition great encouragement for the friends of agricultural education. It seems that all institutions of this kind are ordained to a certain amount of trial and perplexity, before they attain a position of permanent prosperity, and the Michigan Agricultural College is by no means an exception. It has met and overcome the very obstacles with which the organization of such institutions meets in every other State.

The question of uniting the college with the State University was thoroughly discussed, and decided in the negative. The original grant for building purposes, of $56,000, and an additional appropriation of $40,000, were expended and a debt of more than $13,000 incurred in the first two years. The farm was new and uncleared, and the original idea being that no charge should be made for tuition, and that the labor of the students should contribute largely to their support, only disappointment could result.

The board of education decided in December, 1859, that the course of education should be more purely professional, and cut down the course from [illegible] years to two, and recommended that a board of agriculture be created [illegible] should have charge of the college. The legislature in 1860 created a board of agriculture, to which the college was intrusted, and by the same act provided for a four years' course. We give the following extracts from the act reorganizing the institution:

"The design of the institution is to afford thorough instruction in agri[illegible] and the natural sciences connected therewith; to effect that object m[illegible] c[illegible]pletely, the institution shall combine physical with intellectual education, and shall be a high seminary of learning, in which the graduate of the c[illegible] school can commence, pursue, and finish a course of study, termi[illegible]ting [illegible] thorough theoretic and practical instruction in those sciences and arts which b[illegible] directly upon agriculture and kindred industrial pursuits.

"The course of instruction shall embrace the English language and literature, mathematics, civil engineering, agricultural chemistry, animal and vegetable anatomy and physiology, the veterinary art, entomology, geology, and such other natural sciences as may be prescribed, technology, political, rural, and household economy, horticulture, moral philosophy, history, book-keeping, and especially the application of science and the mechanic arts to practical agriculture in the field."

The act requires students to be at least fifteen years of age, and that "thr[illegible] hours of each day shall be devoted by every student of the college to labor upo[illegible] the farm, and no person shall be exempt except for physical disability. B[illegible] a vote of the board of agriculture, at such seasons and such exigencies as d[illegible]mand it, the hours of labor may be increased to four hours, or diminished to tw[illegible] and one-half hours."

The act further provides that the president and professors be appointed b[illegible] the board of agriculture, and that the president, professors, farm manager a[illegible] tutors constitute the faculty; and the secretary of the board of agriculture [illegible] made the secretary of the faculty. The faculty are required to make an an[illegible] report to the board of agriculture, and members of the faculty may [illegible]ke [illegible] minority report; "but no communication at any other time from mem[illegible] [illegible] the faculty shall be entertained by the board, unless they have been sub[illegible] to a meeting of the faculty and sanctioned by a majority."

The general objects of the institution are briefly stated to be—1. To im[illegible] a knowledge of science and its application to the arts of life. 2. To afford [illegible] students the privilege of daily manual labor. 3. To prosecute experiments [illegible] the promotion of agriculture. 4. Instruction in military tactics, as required [illegible]

Congress. 5. To afford the means of a general education to the

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ine gene course of instruction for the preparatory class is in arithmetic, descriptive geo aphy, English grammar, algebra, natural philosophy, and composition. In the college course for freshmen, first half year, algebra, history, geometry; second half year, trigonometry, surveying, practical agriculture, principles of stock-breeding, geology. Sophomore class, first half year, English literature, structural botany, vegetable physiology, elementary chemistry; second half year, entomology, landscape gardening, analytical chemistry, systematic botany, horticulture. Junior class, first half year, physics, agricultural chemistry, inductive logic; second half year, physics, rhetoric, animal physiology. Senior class, first half year, zoology, practical agriculture, mental philosophy, astronomy; second half year, civil engineering, moral philosophy, political economy. Exercises in declamation and composition are also required.

The system of common school education in Michigan is, perhaps, as good as that of any western State, and perhaps not inferior to that of the New England States. In the new and sparsely settled States, however, whatever the system, it is impossible to impart its advantages to all, as may be done where the population is dense. Accordingly great difficulty has been found in the want of qualification by applicants for admission to the agricultural college, and the preparatory class has been necessary to fit pupils for the proper college course. This is felt by the faculty to be a misfortune, and they will gladly welcome the day when the preparatory class may be dispensed with, and the standard of admission to the college course fixed as high as that for admission to our best universities. It is best, no doubt, to educate all classes in our common schools together to as high a standard as possible, and not to separate them into special schools, until they require instruction of a peculiar character to fit them for their intended pursuits.

The buildings at this college are neither elegant nor commodious. They are crowded by their present number of eighty-eight students, and we are assured that if there were sufficient accommodation the number would at once be nearly doubled. With all these disadvantages, the institution presents every appearance of earnest, healthy vitality. The farm and gardens are models of neatness; the fields are fruitful; the out-buildings, though not expensive, are well arranged; the tools well selected and kept in order, and the live stock in such condition as to give pleasure to an amateur. It is a public benefit to collect and preserve for public inspection so good a variety of animals of pure blood as are shown here. The college already possesses Galloway, Ayrshire, Devon, and Shorthorn cattle of the choicest pedigrees; Essex and Suffolk swine; Southdown, Cotswold, Spanish merino, and Black-faced Heath sheep; and it is intended to i this department as rapidly as possible, until it includes cattle, sheep, , and other domestic animals of all the improved breeds.

A botanical garden, fruit garden, and orchards of apples and pears are already blished, and a propagating house and conservatory are to be built immediately. An extensive herbarium has recently been added, and the museums n valuable collections in the various departments of natural history. The ratory is sufficient for present purposes, and so is the apparatus for illustra- physics. The library contains about 1,200 volumes, and a reading-room ic a daily to students, where most of the agricultural publications of the day re found. There seems to exist a kind and friendly relation between teachers pupils at this institution, quite different from that state of hostility which seems the normal condition at ordinary colleges. It is due mainly, no doubt, to the good judgment of the officers, and their kind, familiar intercourse with the students, and, perhaps, something may be claimed for their peculiar system of conducting the labor of the students under the charge of the professors,

who thus are enabled to maintain a kindly sympathy with the young men, both in the study and the field.

Regret was expressed that the isolated position of the college compelled the officers to provide board and dormitories for the pupils, and deprived them of the advantages of female society to so great an extent during their college course. This is one of the evils of college education as usually conducted. The blessed influences of home, and the softening, civilizing effect of association with the pure and gentle of the other sex, are lost just at the period when the passionate, inconsiderate nature of youth most needs such restraints, and society, as expressed by the poet—

> "Not only to keep down the base in man,
> But teach high thought, and amiable words,
> And courtliness, and the desire of fame,
> And love of truth, and all that makes a man."

As the only example which we shall be able to present of the special r for the conduct of such an institution in its details of farm operations, we give nearly entire the system here adopted:

RULES.

Rule 1. At least one week before the commencement of the term in year the superintendent of the farm shall present to the president of the col in writing, a plan of the system of cultivation and management of the fa posed for the season, giving in detail the contemplated operations for each and division. This plan shall embrace—

1. Proposed permanent improvements.
2. The crops to which each field is to be devoted, together with the variety and quantity of seed proposed.
3. The mode of culture, and the kind and quantity of fertilizers proposed for each crop; and
4. A detailed and accurate description of any new seed or mode of culture, i any such is proposed, together with a full account of the advantages likely to be derived therefrom.

Rule 2. The superintendent of the horticultural department shall, in like manner, present a plan of operations for his department, giving the details as minutely as possible for each section and subdivision of the gardens and grou

Rule 3. The faculty shall carefully consider the plans presented by the perintendents, and discuss as fully as possible the principles involved in the proposed methods, and offer such suggestions and amendments as may seem d ble for perfecting and maturing the same. The plans as perfected and ad by the faculty shall be carried out in practice on the farm and in the garde unless modified by the board of agriculture when referred to them.

Rule 4. The plans for conducting the farm and gardens, as soon as determ shall be recorded in full by the secretary in books kept in his office for pose.

Rule 5. The professor of agricultural chemistry shall present to the faculty a detailed statement of a proposed system for the management, manufacture and proper preservation of manures, having reference to the best and most economical disposition of the same, and the adaptation of special manures for particular crops.

Rule 6. The faculty, after a full examination and discussion of the prop system for the management of manures, shall determine the plan to be pu and make suitable provisions for putting into practical operation the plan ado

Rule 7. The superintendents of the farm and gardens shall keep a jour all the work done in each field of their respective departments, and of all tra actions connected with the same. This journal shall be transcribed by the

ce a month into books kept in his office for that purpose. The jour-
embrace—

eneral statement of the weather at the time of preparing the soil, of
ı the crop, of cultivating the same, during its growth and at the time
ng.

ı d account of the crops raised in each field and in the garden, in-
tement of the condition of the soil before cultivation, and during
ation for the crop; the method of seeding, with variety and quantity
d, and its preparation for sowing or planting.

ails of the growth of the crops and any circumstances that may have
l the development or maturing of it.

time of harvesting the crop, the condition in which it is secured, the
n made of the same, as, where stored, whether sold or not, with the
general results.

pose for which the crop has been cultivated—whether for profit, or to
new variety of plant or method of cultivation.

. A committee shall be appointed by the faculty at the commencement
rm in each year, to prepare and report a series of experiments for the
on, which report shall be presented to the faculty at its first meeting in
ollowing.

. The faculty shall decide upon the experiments to be made, and the
f conducting the same, and shall appoint some one of their number to
ıd such experiments. Each officer having in charge any experiment
a full record of his proceedings in conducting the same.

ט. Students, who have attained a suitable proficiency in their studies,
ıppointed to assist in conducting experiments, and they shall, for that
be under the direction of the officer having charge of the same.

l. The superintendent of the farm shall present to the faculty, at their
ing in February, a report on the stock belonging to the college, giving
account of its condition, mode of management, increase and results of
of breeding, together with such suggestions as he may think fit to
ı report shall embrace—

number and kind of horses, their management and condition.

number and condition of each of the different breeds of neat cattle;
er of grade animals, and the breeds from which they have been derived
sed disposition of the same.

number and condition of each distinct breed of sheep, and the grades
ıe, with a statement of the amount and quality of wool produced, their
ent, increase, &c.

ıe.

try.

!. Each breed of domestic animals shall be so kept as to avoid any
crossing or mixing with any other breed. Cross-breeding shall not
ted, except to accomplish a definite object, or for the purpose of
t, and then only in accordance with a plan setting forth the object to
lished and adopted by the faculty, who shall prescribe such regula-
y be necessary for putting the same into practical operation.

ı. An accurate record of the stock belonging to the college shall be
book provided for that purpose. The details of the breeding and
of each breed shall be carefully and distinctly stated, together
urpose for which each animal is kept, and the disposition made of the

. For the purpose of imparting to the student an accurate knowledge
as an art, the instructors in the several departments of the college,
ercises, shall illustrate the sciences taught, as far as possible, by

a thorough discussion of the principles involved in the details of the operations on the farm and in the garden.

Rule 15. The superintendents of the farm and gardens shall make a report on the implements used in their respective departments, givi sults of their experience in the use of each implement, and its adapte purpose for which it was designed, and its comparative value. Any n ment that has been tried during the year shall be particularly describ accurate estimate of its merits given.

Rule 16. A committee on buildings shall be appointed each year, report to the faculty the condition of the buildings, and recommend s tions and improvements as may seem desirable. The faculty shall examine the report when presented, and shall make such recommend the board of agriculture as they may deem for the interest of the col

Rule 17. The state board of agriculture shall determine what pro the whole number of students on the farm and in the garden shall be to each. The list of students shall be examined each week to see proper proportion is employed in each department.

Rule 18. Students shall labor both on the farm and in the garder alternations from the farm to the garden and from the garden to the f be as frequent as the proportion of farm and garden labor, as determin State board of agriculture will permit, provided that such changes s cur oftener than once a week.

(*April* 6th, 1863. Rule 18 was amended by an addition that one c work an entire year on the garden, and another on the farm, for the riod.)

Rule 19. Students shall be employed with a view to their attaining est proficiency in the art of farming, without reference to the greatest gain to the college.

Rule 20. Work at the college shall be classified as follows: 1. Care 2. Care of tools, and repairing the same; 3. Care of grounds and sh 4. Preparation of ground for crops, ploughing, &c.; 5. Sowing or plant ent kinds of seeds; 6. Weeding and hoeing; harvesting and securin 8. Preparation of manures; 9. Gathering and preserving seeds; 10. duties, care of books, &c.

Rule 21. The faculty shall make such arrangements that each stu perform a proper proportion of labor of the several kinds, as classifi 20.

Rule 22. The superintendents of the farm and gardens shall, once deliver to the students lectures on topics connected with practical arr and management of farms and gardens.

Rule 23. The professor of agricultural chemistry, shall cause a dail ological journal to be kept, according to the system adopted by the Sm Institution.

Rule 24. Any officer having in charge the development of any of th who shall deem any change or modification of them advisable, shall the faculty a written statement, setting forth in full the reasons for th change. Changes or modifications adopted by the Faculty shall be re the secretary.

The legislature granted to the college at the outset, salt spring lar sold for $56,320, and prior to 1865 had made various appropriations ing to $112,500. It has also given to the college certain swamp land at $30,000, and the 240,000 acres of scrip granted by Congress, which located in the State, on lands valued at $600,000, thus giving this ins magnificent endowment.

PENNSYLVANIA.

ırmers' High School of Pennsylvania" was opened in Centre county, ı of February, 1859, and its first catalogue gives the names of 119 It was opened under very unfavorable circumstances, the buildings ıi ed and with no suitable accommodations. It has struggled along of difficulties, (among which a large debt, contracted in part in con- ange and ill-arranged building of stone, six stories high and 334 feet ıt the least,) until the present time, when it is hoped the grant of nay place it on a sure foundation.

the institution took the name of "The Agricultural College of Penn-

the common error of over-building, the officers of this college fell ɛr, which has much increased its embarrassments. They fixed the board and tuition of students for the year at $100, probably ex- ɔm the labor of the students and the increase of the farm a much ɪribution to their funds than experience justifies. The amount of this recently doubled, and will probably now be found low enough.

ted the institution in June, 1865, unfortunately in the absence of Dr. president, who had then recently been inaugurated as the successor aented Dr. Pugh, under whom the college course had been recon- A farm of 400 acres of excellent land is attached to the college. The h not so diversified as could be wished, is productive. They had on 65 acres of wheat, 25 of oats and barley, 60 of corn, with a large hay, some acres in a garden and nurseries. Their working stock ıf five mules and two horses, and no attempt had yet been made to ɔlood stock of any kind. All the labor is performed by the superin- ith one man and the students, who labor three hours a day, in four ts, under the direction of the superintendent. All agree that much is required on the estate to bring it up to a proper standard. The emote from any town or village, and is therefore compelled to provide rooms for all its students.

; is worth knowing that this college has had constantly a large num- ents, and usually more applicants than could be received. We trust eople and legislature of Pennsylvania will give this institution all support, and that a career of prosperity and usefulness may be per- secured.

rse of study, with such extracts from their programme as are deemed will be found below. The preparatory course, in many States, may in the common schools. The faculty and board of instruction con- lent, who is professor of political economy and constitutional law; ıent, who is professor of botany, physiology and horticulture; a ɪ surveying, mechanics, and engineering; a professor of chemistry fic agriculture; a professor of mathematics and astronomy, and lec- ctics; a professor of philosophy and English literature; a lecturer on surgery and medicine; a teacher of book-keeping, and a farm super- with two teachers in the preparatory department.

REQUISITES FOR ADMISSION.

ıtory department.—Certificates of good character and fair acquaint- the rudiments of English grammar, geography, and arithmetic. Ap- r admission to the first preparatory class will be examined in the the second class.

ıte department.—Candidates for admission to the fourth class will be on the studies of the preparatory course, or their equivalents. For

admission to any of the higher classes, candidates will be examined on the studies which shall have been pursued by the classes they propose to enter, or their equivalents. In all cases, certificates of good character must be presented before an examination will be granted.

COURSE OF STUDY.

Second preparatory class.—Arithmetic, English grammar, geography, reading, writing, and orthography.

First preparatory class.—Elementary algebra, history of the United States, elementary physiology, book-keeping, English grammar and composition, reading and orthography.

COLLEGIATE COURSE.

Fourth class, first term.—Physiology, algebra, English grammar, and composition.

Second term.—Natural philosophy, plane geometry, universal history, grammar, and composition.

Third class, first term.—Structural botany, solid geometry, chemistry, universal history, elocution.

Second term.—Horticulture, entomology, trigonometry, surveying, navigation, chemistry, logic, elocution.

Second class, first term.—Political economy, systematic botany, analytical geometry, laboratory practice, rhetoric, selected exercises in speaking.

Second term.—Constitution of the United States, zoology, calculus, physical chemistry, and mineralogy (lectures,) laboratory practice, mental philosophy, selected exercises in speaking.

First class, first term.—Agricultural law (lectures,) geology, analytical mechanics, chemistry (lectures,) laboratory practice, moral philosophy, original exercises in speaking.

Second term.—History (lectures,) astronomy, agricultural chemistry (lectures,) scientific agriculture (lectures,) tactics (lectures,) evidences of Christianity, original exercises in speaking. Equivalent studies may be substituted for calculus and analytical mechanics; also for chemistry and laboratory practice in the first class.

Latin and Greek are not included in the regular course; but instructi them is given to students who desire it.

PARTIAL AND ADDITIONAL COURSES OF STUDY.

To students who are not able to take so high a course in mathematics, permission will be given to substitute, in place of this study, a more extensive prosecution of the study of any of the natural sciences than is required in the full course. To those completing such a course of study suitable diplomas will be awarded.

For the benefit of any who wish to acquire general scientific knowledge, and special practical information, preparatory to the prosecution of farming, a practical course may be selected from the regular college studies. This course is designed for such as wish to remain for a limited period only, in order to be familiar with the various operations of the farm, garden and nursery, and at the same time attend some of the classes in the college. This course is not re mended to any but those who are unable, on account of ill-health or age, or any other good reason, to take either the full or scientific courses; and no under twenty-one years of age will be permitted to take it, without a writ request to that effect, addressed to the faculty, by his parent or

Practical instruction in tactics is given weekly during the whole cou

IOWA.

I give the following history of the enterprise in this State, in the words of its secretary, Peter Melendy, esq., and refer the reader to the frontispiece for a view of the college building, and to the statement of the architect for a description of the same:

At the session of the legislature of 1858 an act was passed providing for the establishment of a State agricultural college and farm, with a board of trustees, which shall be connected with the entire agricultural interests of the State. M. W. Robinson, Timothy Day, John Wright, G. W. F. Sherwin, William Duane Wilson, Richard Gaines, Suel Foster, J. W. Henderson, Clement Coffin, E. N. Williams and E. H. Day, were appointed the first trustees. Clement Coffin and E. H. Williams would not serve. Peter Melendy and John Pattee were appointed to fill their seats.

The institution is managed by a board of trustees, who are appointed by the legislature, one being taken from each judicial district in the State, and embracing the governor and president of the State Agricultural Society, being in all fourteen members. The board serves without pay for their services. Its officers are a president pro tem., a secretary and treasurer, and an executive committee of three to act during the interim of the meetings of the board.

In 1858 the legislature passed an act appropriating ten thousand dollars for the purchase of a farm on which to locate an agricultural college. A farm was purchased in 1859, in Story county, situated about midway between Nevada and Boonsboro, and about thirty miles directly north of Des Moines. The Cedar Rapids and Missouri railroad is now running directly through the farm, dividing it so as to leave about one hundred and sixty acres on the north side and about four hundred and eighty-eight acres on the south side of the railroad. The farm contains six hundred and forty-eight acres, and is admirably adapted to the purposes of the institution, embracing all the leading varie[ties] of soil in the State. It is well watered by Squaw and Clear creeks [running t]hrough the farm—Squaw creek on the east, Clear creek on the west [side], affording an inexhaustible supply of pure stock water.

Near the centre of the farm there are several fine springs, affording a good [suppl]y of water. The timber is principally black walnut, oak, elm, white maple, cotton-wood, ash, hickory, and numerous other valuable varieties, covering [ab]out one hundred and fifty acres. The farm is about four hundred rods long [fr]om east to west, and about two hundred and fifty-nine rods wide from north [t]o south. After deducting the one hundred and fifty acres above described, [t]here remain four hundred and ninety-eight acres of prairie land suitable for grass [a]nd grain. There is probably not far from one hundred and eighty acres of low [bott]om land, about one hundred of which is covered with timber; the remainder [is] equally divided between wet and dry bottom.

The low land in the timber is a rich, deep, black, sandy loam, with clay subsoil, [bu]t not inclined to hold water on the surface. Next west adjoining the tim[be]r is a fine, smooth, level tract of low land, remarkably well adapted for grass, [w]ould by a judicious system of drainage be converted into a most produc[tive] corn land, not excelled in the west. Beyond this to the northwest is a tract, known in this State as second bottom land, being level, dry and very [rich], and remarkably productive for almost every crop grown in this latitude. [The s]oil is a mixture of black sand, fine gravel, and rich black alluvium and [th]e soil proper, comprising perhaps the most desirable soil known to the [agricult]urist. West of this is a large tract of level prairie, the soil being dry, intermixed with fine gravel in places, with clay subsoil, being a fair [represe]ntative of the prevailing prairie soil of the State. On the northwest of the farm is a tract of perhaps forty acres of clay soil, most of which is [covere]d with a heavy growth of oak, walnut, and hickory timber. Though

called clay soil, this land is a fair specimen of what is known in this St "barrens" and "timber land." The soil is a mixture of prairie and clay, heavy clay subsoil, and is considered the best wheat and fruit land in the ern States. On the south side of the farm is about ninety acres of high r prairie, intermixed with gravel, and well adapted for almost any grain crops, warm and dry, the ravines which intersect it carrying off all surplus water u the wettest seasons. The gravel contained in the soil is mostly on the surface and is turned under by the first ploughing, nearly disappearing after cultivation There are five sand and gravel banks on the farm, furnishing an inexhaustibl supply for building purposes, and for grading roads, walks and yards.

There is also on the farm good clay for making brick convenient to where th college is now being built.

The improvements consist of a good, substantial, brick farm-house, with basement of stone, making a cellar under the whole building. The h completed except painting, and when furnished will cost about four thou dollars. The brick were manufactured on the farm. There is also a good ban on the place, well finished and painted, of good height, and is forty-two b sixty feet in size, capable of providing storage room for grain, and shelter the necessary teams and stock connected with the farm. There is a good s basement under the barn, and a large yard enclosed by a substantial fe also a fine smoke and ash house, fourteen feet square, built of brick.

A great portion of the work and material used in the erection of t buildings was furnished in payment of voluntary subscriptions by citizens in vicinity.

There is about four hundred acres of the farm, enclosed by a substantial fence a part of which is built by boards and posts, five boards high, and the remainde of rails staked and ridered, eight rails high. The fences are built of good ma terials, and are put up in a very substantial manner. Of the land enclosed about one hundred and fifty-one acres are under cultivation.

There is a fine young orchard of about four hundred thrifty trees near th house, enclosed by a good fence. This experiment has satisfied the people the vicinity that the prevalent opinion that fruit cannot be raised upon open prairies is entirely erroneous. Fine apples have been grown upon of these trees, which had been planted out but *four years* on *level open p* To be successful it only requires ordinary care, such as one would bestow u a corn crop, and the farmers are profiting by this demonstration placed their eyes. About seventy-five grape vines have been planted near the orc of several different varieties, among which are the Concord, Clinton, Isab and Catawba. They are doing well, making a fine growth, and producing s fruit.

Building material can be found in abundance on the farm and in the in vicinity. The necessary wood to burn the brick can be procured fr ow timber, which is fast going to waste, and the best kind of clay and sand for manufacture of the brick is found in abundance on the farm. Stone can b had within three and a half miles, and lime within six miles of the farm.

The farm, which has been fully described, was purchased at a cost of $5,379 1 In consideration of having the college building located at that place, the cit of Story and Boone counties made liberal donations of land, money, labor, materials, to the amount of about seven thousand dollars, to assist in improv the farm and erecting the necessary farm buildings.

DONATIONS.—Story county donated ten thousand dollars in the bonds of county, bearing seven per cent. interest. There is also appropriated the ceeds of the sale of five sections of land in Jasper county, known as the C tol lands. The value of the lands is about $17,000.

It was expected that the legislature of 1860 would have made an ap ri sufficient to commence the erection of suitable college buildings, but

condition of the State would not justify it, an appropriation was not At the session of 1863 an appropriation was not expected, as the iances of the State were needed to meet the extraordinary expenditures to the suppression of the rebellion. Hence nothing had been done to s prospective revenue since the institution was organized, until the last We have done what we deemed prudent in opening a farm and erecting buildings suitable for a dwelling for a farmer, and also shelter for the l animals.

d the expenditures necessary to place the farm under a fair state of n, the trustees did not feel justified in making appropriations from the mount in their hands, but preferred reserving the best of the assets dowment to meet the expenses of the institution when in operation, at when it had the ability, the State would make the needed appro- or college buildings. But during this time the people of the State supposed that the buildings were erected, and that the college would pen to the public, and many applications have been made to receive Had it not been for the extraordinary condition of the financial mat- he State, such would doubtless have been the condition of the institu- he opening of the present year. It is now about seven years since the of the college farm. If all this could not have been done, a general on, or hope at least, was felt by its friends generally, that the farm e open for experimental husbandry. Even this could not be accom- under the circumstances, without involving an expenditure which it ght would not be justified by the people of the State, unless the col- tution was fully provided for.

y, 1862, Congress appropriated to the several loyal States in the Union, ultural colleges, 30,000 acres of land for each senator and representa- Congress. The amount under this grant to the State of Iowa was icres. The State of Iowa, at the special session in September, 1862, the grant with the conditions imposed therein. The lands have been by an agent every way competent, appointed by the governor and ap- y the board of trustees of the college, as required by the acceptance e State, and they have been approved and certified to the State.

embrace some of the best unentered lands in the State, and when pre- sale, will command the attention of immigrants. As the interest on the of the sales of these lands is exclusively devoted to meet the annual ires of the institution, there will be a fund soon created to sustain the a. This munificent grant having relieved the board from any anxiety to the future endowment of the institution, they felt that a portion of red assets might safely be used to place the farm in a condition to ex- upon crops, the purchase of several of the leading races of improved f all kinds, and testing their value by crossing on native breeds, best feeding, shelter, &c., and in beautifying the farm with useful trees bery, and preparing fully for the work contemplated in the establish- he institution.

a brief history of the institution under the management of the board s, which is almost exclusively confined to the farm and the operations The next point is the college proper, and the course of studies to be herein, which are specified in the organic law as follows, with some visions in regard to students, &c.

ourse of instruction shall include the following branches, to wit: nat- osophy, chemistry, botany, horticulture, fruit-growing, forestry, ani- vegetable anatomy, geology, mineralogy, meteorology, entomology, veterinary art, plane mensuration, levelling, surveying, book-keeping mechanical arts as are directly connected with agriculture. Also,

such other studies as the trustees may from time to time prescribe, not sistent with the purposes of this act.

The board of trustees shall establish such professorships as they maj best to carry into effect the provisions of this act. Tuition in the college established shall be forever free to pupils from this State over fourteen y age, and who have been residents of the State six months previous to th mission. Applicants for admission must be of good moral character, read and write the English language with ease and correctness, and also satisfactory examination in the fundamental rules of arithmetic.

The trustees, upon consultation with the professors and teachers, shall fr to time establish rules regulating the number of hours, to be not less th in winter and three in summer, which shall be devoted to manual labor a compensation therefor; and no student shall be exempt from such labor in case of sickness or other infirmity.

OBJECTS OF THE INSTITUTION.—The Iowa State Agricultural College l its object, to associate a high state of intelligence with the practice of a ture and the industrial or mechanic arts, and to seek to make use of this gence in developing the agricultural resources of the country and protect interests. It proposes to do this by several means:

1. As a purely educational institution, its course of instruction is to i the entire range of natural sciences, but will embrace more especially a pr bearing upon the every day duties of life, in order to make the student f with the things immediately around him, and with the powers of nature ploys, and with the material through the instrumentality of which, und blessing of Providence, he lives and moves and has his being; and since a ture does this, more than any other of the industrial arts, it follows th should receive by far the highest degree of attention. The course of i tion is to be thorough, so that it will not only afford the student the science, but will discipline his mind to habits of thought and enabl fully to comprehend the abstract principles involved in the practical ope of life. In doing this, it is not deemed possible to educate every a turist, artisan, mechanic, and business man in the State, but to send out students educated in the college course, that they, by the influence of p and example, may infuse new life and intelligence into the several comm they may enter. A single individual who is thoroughly educated in the ples and practice of an art followed by a community, will often exert a mor tary influence upon the practice of this art by the community, than result from sending the *whole community* to a school of lower order tha which he attended. A single practical school of the highest order in (the Ecole Polytechnique,) during the last generation, made France a celebrated alike for profound philosophers, great statesmen, able gener military men, and civil engineers. If one high school of practical cha established, subordinate schools affording the elementary education of the will follow in due time.

2. *As a practical education*, the trustees of the Iowa Agricultural (have adopted the fundamental principle, that whatever is necessary for have done, it is honorable for man to do, and that the grades of honor at to all labor are dependent upon the talent and fidelity exhibited in perf it. It is further considered essential as a part of the student's education be taught the practical application, in the field and laboratory, of the pri of his studies in the class-room; and manual labor is also necessary for t servation of health, and the maintenance of the habits of industry. A dental but not unimportant result of the operations of these principles i duction of the cost of tuition by the value of the labor, so that the colle take students at very low rates of admission.

All students, without regard to pecuniary circumstances, are, therefore,

nanual labor as an essential part of the college education, and disci- training. In these respects consists a most essential difference e idea associated with manual labor and that of all other attempts ofore to combine manual labor with study. Instead of the idea of d want being associated with those who labor, that of laziness and ess is associated with those who refuse to work efficiently, and the of established institutions has already, most assuredly, shown that nan of whom there is any hope for future usefulness in life is insen- disgrace which thus attaches to the lazy, who will work only as they d, and cheat their fellow students by refusing to do their share of the ned them; and nothing is more conclusively settled than that those who are most studious and industrious in class, work the most effi- d are the most trustworthy, in the performance of their daily work.

experimental institution, our college has an unbounded field for e principles of agricultural science, which shall ultimately constitute t of instruction in its class-rooms, will be a prominent and important it. The development of no other department will yield richer and ng results, or confer more substantial benefit upon agricultural practice Much time, however, is required to make thorough and reliable its—they will not pay at once. As well might the farmer expect to rop the day he sows his grain. They will, however, ultimately pay a fold, as have the practical application of the sciences of electricity, optics, in the present day, paid for the half century of apparently purely scientific investigations that led to the results now obtained m.

sign of this institution is different from all other educational institutions untry, excepting one in Pennsylvania and one in Michigan, now in l operation. By the union of labor and study they are both placed roper position, and thus only are exhibited in their true dignity. Here taught to walk together, and that separation is degrading to both. lent's mind and hands are first prepared to promote skill and success portant and honorable occupation of cultivating the soil, but he will be ually fitted to fill with honor any other position in life. There is thus a practical and equal education, so much needed by the great body of ers, and cheap enough to be embraced by all. "The farmer who ch an equal education for his son, feels an *imperative necessity* for an n such as this. He sees that the son of a farmer who has been a four urse at our old colleges returns with his eyes and his thoughts and the is mind directed *away* from the objects which worthily and usefully is father and his brothers. He is useless and inferior in the sphere ome; he cannot labor; he must go from home; he is *driven* from it; o nothing but enter a profession, and in any profession he may enter, nnot make a conspicuous mark, he is a miserable thing at best, st certain to fall into ruinous habits and to become their victim. unhappy and disappointed father loses not only the cost of his his own struggles and expended energy, but in three cases out of *himself*. How different the case in circumstances which such an n as ours is destined to establish! The boy, in great part, aids to work education. Instead of dragging on his father, he aids him; instead g physical abilities, through want of exercise, he labors and devel- ; while his mind is being stored with both practical and refining knowl- are educated to expertness in a thousand operations, and his l str th. How delightful will be the meeting between the our al school and his father and brothers! He has stores l there is a mutual interest and subjects of conver- y . The proud and gratified father will bless the

means by which his highest wishes have been accomplished." So plain is the need of this course of training even to the dullest mind, and so plain is the method of establishing it, it is wonderful up to this day that such schools are only commencing in this country.

The inquiry will naturally be made in regard to the cost of educating and sustaining a scholar in the college for one year. In the Farmers' High School of Pennsylvania the price for board, lodging, washing, fuel and lights is fixed at $200 per annum. The cost in our institution would not exceed this sum, from which would be deducted the amount credited for labor on the farm. The tuition is made free by law.

The financial condition of the institution is in a healthy state. The State has given to the farm proper $10,000, and she has property for this small outlay amounting to $59,834 39. The land is worth $10,000 more than the State gave for it, thus making the farm proper worth to-day $69,834 39, and with the munificent grant from the government, valued at $480,000, makes a grand total value of $567,834 39. At the last session of the legislature a sufficient amount was appropriated to complete the college building. At the last meeting of the board the contract was let to responsible parties to complete the building by September, 1867. The following is a description of the building, by the architect, Mr. C. A. Dunham, of Burlington, Iowa.

Description of the Iowa State Agricultural College building.—The outline of the ground plan is that of the letter E, one hundred and fifty-six feet in length by seventy feet in width, through wings which are so arranged that they can be extended at any future time as may be desired. The building is five stories in height—first story nine feet, second story fourteen feet, third and fourth stories twelve feet, attic story ten feet six inches. Forty-two feet of the central portion of principal front projects seven feet, with a veranda ten feet in width. At the ends of the principal front there are two towers twenty-one feet square, projecting four feet from face of main walls. The principal tower rises to the height of one hundred and thirty-six feet, and at the elevation of one hundred feet there is a bell-turret, with projecting balconies on the four sides, to accommodate those who wish to view one of the most beautiful prairie landscapes in the west. The principal story is gained by ascending a flight of stone steps of ample dimensions, landing upon the veranda heretofore mentioned. After passing through the entrance doors, which open into a hall eight feet in width, to the right is the reception room, sixteen feet by twenty-four feet; opposite is the president's suite of rooms—parlor, sixteen by twenty-four feet; chamber, six by sixteen feet, with ample closet room. Opposite these rooms is the lib , eighteen feet by forty, located in the central part of the building. There is a corridor of ample width running through the centre of the building and w in each story. After leaving the library room, turning to the left, on the side of the corridor, is located the museum, eighteen by fifty-two feet, w is fitted with cases and shelves for specimens. Returning back to the hall the right is the entrance to the lecture-room, which is in the north wing of building, thirty-four by fifty feet, with seats around on the arcs of circles, ting from the lecturer's stand. In the rear of the lecturer's stand is a doorw communicating with the museum, for the more ready introduction of anat and other specimens upon the lecturer's desk and stand. It is the design have around the walls of this room a series of pictures, painted in oil, repre ing scenes in the life of the agriculturist and the arts and sciences. Retrac our steps, we return to the corridor, and approaching the library, to the and on each end of the library room there will be found the two principal cases, eight feet in width, circular in form, incased in two octagon towers ing from the basement to the attic story. Further on down the corridor be found the recitation rooms. At the ends of the veranda, on the pri front, stepping down four steps into an area of nearly the width of the v

pal entrance to the basement story, is found halls and corridors run-ame as those described in the principal story. After passing through ray to the left is the steward's room; to the right is the laboratory, ıing is the bath-room. At the end of the long corridor, entrance is to the dining-room, which is thirty-three feet by forty feet. Passing on he dining-room, to the left is to be found the kitchen, twenty by ur feet, fitted with range, sink, pump, and boiler. Opening out of the a doorway leading to cellar below, and another door leads to a pan-shes, with communication with dining-room. Further along is to be ;ullery and store room of ample size. There is a door from the kitchen ;ating with steps in the area to exterior. Returning to the long corri-)assing by one flight of principal stairs, and opening the door on the d, can be found the laboratory, a room eighteen by thirty-six, with d other fixtures. This is but a temporary location for the laboratory, e intention to put up a building somewhat isolated from the main build-at purpose. Further along, passing the other staircase and turning to are to be found the wash-rooms, sixteen by twenty-two feet. Oppo-laundry, sixteen feet by twenty-two, and at one end of the laundry is oom, fourteen by sixteen feet. In front of these rooms, and running ·ith the front, is to be found four large servants' rooms and one large the housekeeper. There are five external doors in this story, four ; of the corridors, and one out of the kitchen.

.ıng either of the flights of stairs, and landing in the principal corridor rd story, can be found in the rear of the central portion of the building the library room the armory, sixteen by eighteen feet, opposite the ıom, sixteen by eighteen feet. Returning and passing down the corri-' way can be found professors' and recitation rooms, fifteen by eighteen twenty-one students' rooms, fourteen by sixteen feet each.

ırth and fifth stories are nearly the same as the third, each story con-ıirty rooms, each ten feet by fourteen feet, and two recitation rooms, een feet by twenty. There is a cellar seven feet high under the dining-:hen, laboratory, and corridors. Also fuel vaults in rear of cellar under r. The building is heated with eight hot-air furnaces. Opposite to ; warm air is admitted into the rooms there is a register of the same ıs that of the warm air register, to draw off the vitiated air downwards,)uilt in the hollow core of the walls. There is also a small register eiling line, for summer ventilation, opening into flues which will con-the summit of the roofs. The basement story is faced up with cut-:n feet above the ground. The walls above are built of brick. Cut-ssings to the doors and windows, with string and belt courses of the he roof is of the Mansard style, covered with slates in two patterns.)f the centre portion of the building is made to rise at a more acute give the principal entrance more prominence, and to give a more pleas-ıtline. All the openings have circular heads. The east, north, and s stand upon a terrace extending out 100 feet from the walls of the The outer edge of the terrace is some five feet above the natural of the earth. The terrace will have two fountains and other appro-orations.

MASSACHUSETTS.

achı tts Agricultural College was incorporated in 1863, and, by ı o -tenth of the land scrip granted by Congress to the State a to college as a fund with which to buy a farm. Two-thirds of the remainder of the scrip was granted to the college for its other third being given to the Institute of Technology, situated

in Boston. With the avails of the tenth, and some private aid, an excellent fa of nearly 400 acres has been purchased in Amherst, about 100 miles west Boston, in the valley of the Connecticut. The cost of the farm was abo $40,000. The sum of $75,000 has also been raised by the town of Amhe and private subscribers, for the purpose of erecting buildings. The legislatu has appropriated $10,000 for contingent expenses, and advanced the like amou to be refunded out of the income from the land scrip. A president has been elect and plans for a college building have been procured, and preparations are ma for its immediate erection. No definite course of study has yet been establishe but the following extract from the annual report of the trustees indicates t general system in contemplation:

PLAN OF ORGANIZATION.

The estate, which comprises nearly four hundred acres of excellent lan affording great variety of surface and soil, is to be furnished with model far buildings, to be erected from time to time, as the increasing productiveness the farm shall require; to be supplied with farm implements of the most approv kinds, and stocked with a variety of the best thoroughbred and other ani that we may be able to procure; the farm to be conducted, primarily, for u education of the pupils, by way of illustration in agriculture, horticulture, botan stock-growing and other rural affairs.

A college building, to be immediately erected for lecture and recitation room library, museums of natural history and of farm implements and products, chem cal laboratories, halls for exhibition and military drill, armory and chapel rooms for the president, librarian and other officers.

A president, who shall reside at the farm, and have general charge of its a under the trustees; a faculty, composed of the president and resident profe who shall administer the government and execute the prescribed regulat and a farm superintendent, who shall direct the ordinary labor, and manage details of business on the farm.

The following departments, under such professors and assistants as may necessary: A department of agriculture and horticulture; a department physics, mathematics, and engineering; a department of natural history; a d partment of chemistry; a department of political economy, intellectual phi phy, and Christian morals; a department of comparative anatomy and an physiology, including veterinary surgery and medicine; a department of mo languages and literature; and a department of physical education, inc military tactics. The general course of study to be four years, with pro for shorter elective courses.

For admission, students to be sixteen years of age, and to pass such ex nation as is required for admission to our normal schools, and such further e amination as shall be prescribed. Manual labor to be required daily of student, as may be arranged by the faculty, who may allow compensatio extra work. Tuition to be fixed by the trustees, with such free scholarship may be established by public and private bounty.

CONNECTICUT.

In this State the avails of the grant of Congress have been given in c to Yale College, and the school of agriculture has been connected with the S field Scientific School.

From the high character of this ancient and well-endowed college, we safely conclude that it will furnish the best possible illustration of the e diency of uniting an agricultural college with other institutions. In place, some objections to such an arrangement are suggested. These obje are, in substance, discussed by the authorities of Yale in the paper wl

lows, and we gladly avail ourselves of their statement of their views on the subject.

We give below the full programme of this institution. The course of study is well considered, and being far more in detail than any other published in this country, will be of great value to those engaged in the work of organizing colleges under the recent act of Congress. The first or preparatory year is not devoted especially to agriculture, and might be omitted or modified.

SHEFFIELD SCIENTIFIC SCHOOL OF YALE COLLEGE.

Course of agriculture—Conditions of admission.—The full course of instruction for students in agriculture occupies three years. Applicants for admission must be sixteen years of age, and must bring satisfactory testimonials of good character. To profit by the instructions of this course, they should be familiar with rural affairs, as acquired by some years' residence on a farm. They must also sustain an examination in the following books or their equivalents: Arithmetic—Thompson's Higher Arithmetic; algebra—Day, or Davies; geometry—Davies's Legendre; plane trigonometry—Loomis, or Davies; the elements of natural philosophy—Loomis, or Olmsted; English grammar, geography, and the history of the United States.

To the shorter course of seven months persons are admitted on the same conditions as above, save that no examination is required.

PROGRAMME OF STUDIES.

First or preparatory year, first term.—*English language*—Rhetoric, exercises in composition. *French*—Fasquelle's Course, De Fivas' Reader. *Physics*—Silliman's Principles. *Chemistry*—Youman's. *Mathematics*—Davies' Analytical Geometry, spherical trigonometry, surveying.

Second term.—*English*—Rhetoric, exercises in composition, practical exercises in elocution. *French*—Fasquelle, De Fivas. *Physics*—Silliman's Principles, and lectures. *Chemistry*—Youman's. *Mathematics*—Descriptive geometry and geometrical drawing. *Botany*—Gray's First Lessons.

Third term.—*French*—Selections from Classical Authors. *Physics*—Silliman's Principles and Academical Lectures. *Chemistry. Mathematics*—Principles of perspective. *Botany*—Gray's Manual. *Drawing*—Free-hand practice.

Second year, first term.—*Agriculture*—Chemistry; structure and physiology of the plants; water, atmosphere, and soil, in their relations to vegetable production; improvement of the soil; tillage, drainage, amendments, and fertilizers; lectures. *Experimental and analytical chemistry,* in their agricultural applications; daily laboratory practice. *French*—continued. *German*—Woodbury's Method. *Meteorology*—Academical lectures.

Second year, second term.—*Agriculture*—Chemistry and physiology of domestic animals; digestion, respiration, assimilation, and excretion; composition, preparation, and value of the kinds of fodder, milk, butter, cheese, flesh and wool, as agricultural products; lectures. *Experimental Chemistry*—Laboratory practice. *French* and *German* continued. *Physical geography*—lectures. *Zoology*—lectures.

Third term.—*Horticulture and kitchen gardening*—Propagation, training, culture of fruit trees, the vine, small fruits, and vegetables; lectures. *Mineralogy*—Lectures and practical exercises. *Experimental Chemistry*—Laboratory practice. *French* or *German*—continued. *Drawing*—Free-hand practice. *Excursions*—Botanical, zoological, &c.

Third year, first term.—*Agriculture*—The staple grain, forage, root and crops of the northern States; their varieties; soils adapted for them; preparation of soil, seeding, cultivation, harvesting, and preparation for market;

lectures. *Agricultural zoology*—Origin and natural history of do mals; insects useful and injurious to vegetation; lectures. *Geology*—D Manual. *French* or *German*—selections. *Excursions*—Agricultural, zoolo cal, geological, &c.

Second term.—*Agriculture*—Raising and care of domestic animals, char teristics and adaptation of breeds; cattle for beef and draught; the dairy; she for wool and mutton; horses, swine; pasturing, soiling, stall-feeding; tobac hops, &c.; Lectures. *Forestry*—Preservation, culture, and uses of forests a forest trees; Lectures. *Human anatomy and physiology;* Lectures. *Agric tural botany*—Weeds and noxious plants; Lectures. French or German.

Third term.—*Rural economy*—History of agriculture and sketches of hu bandry in foreign countries. Adaptation of farming to soil, climate, market, a other natural and economical conditions. Systems of husbandry, stock, she grain, and mixed farming; Lectures. *Farm accounts*—Lectures and practi exercises. *Excursions*—Agricultural, geological, zoological, and botanical. *E aminations* in the studies of the course.

The students will be required to make full written reports of the lectur and will be subjected to annual and final examinations. The instruction the first year will be chiefly by recitation; that of the second and third y by lecture. The lectures will reflect as faithfully as possible the most re state of science and the most improved practice. All the courses of lectur &c., will be fully illustrated by specimens, experiments, and demonstrati Collections of plants, seeds, woods, and vegetable products; of minerals, roc soils, and fertilizers; samples of wool; casts and drawings of improved stoc specimens of birds, and of injurious insects in all stages of development, w be provided in the agricultural museum. Many important topics in agricultu practice, not mentioned in the above brief programme—for example, the selecti and care of implements, farm buildings, fencing, plan of work for the year adapted to the season, &c., methods of conducting farm experiments, &c., &c. will be suitably discussed. Weekly excursions in the neighborhood, and o sionally to a distance, under direction of the professors, will teach the of observing natural objects, especially plants and insects useful and injuri in agriculture, and will furnish illustrations of good stock, of farm buildings, orchards, market gardens, use of implements, &c. The agricultural wareho of New Haven are well-stocked museums of implements and machines, accessi to students. Like some of the best agricultural colleges of Europe, the sch has at present no connexion with a farm. In considering what disadvanta this may prove to the student, it should be remembered that the details farming cannot be learned advantageously in an agricultural school. They only to be acquired during a long apprenticeship on the farm. No young m is well prepared to attend an agricultural school who is not practically famil with most of the ordinary operations of farming. What he is to learn bey this is mainly communicable by the teacher, with such aids as the lecture-ro and museum can furnish. Their deficiencies may be almost wholly sup by excursions to neighboring farms and gardens. A few hours' walk or r will bring the classes to good illustrations of dairies, of improved stock of varieties; will exhibit the culture of most kinds of crops under a variety circumstances which no single farm can imitate, and which will greatly enha the value of the instruction to be derived. A portion of time corresponding what would be properly spent upon a college farm, were one connected w the school, will accordingly be devoted to excursions. A library and readi room supplied with American and foreign agricultural books and periodic will be provided at an early day. Features of the course to which attentio especially called are the following:

1. The comparatively high standard of admission has the advantage securing such an amount of mental discipline as to fit the pupil for

. enables him in three years to go through a course equal to that
iour years in most agricultural colleges. The earnest student will
ulty in preparation for admission, as the subjects he is required to
aught in all the high schools.
ual attention is given to French and German. The agricultural
f these languages is more abundant, and, in its scientific aspects,
:ed than that of English. The educated farmer should be able to
with ease, in order to keep pace with the rapid progress now making
ry and practice of his art. It is intended that the student shall read,
latter part of his course, standard French or German agricultural
he place of the usual classics.
iture deemed highly important is experimental chemistry, pursued
ratory for several hours daily during the second year. The student,
ing from lecture or text-book the characters which belong to sugar,
sphoric acid, casein, gypsum, guano, and other substances of agri-
iificance, takes them into his own hands, prepares, examines, or
iem under the teacher's guidance. He thus fixes and makes definite
:dge, and, what is of the greatest value, he learns how to observe,
is vision to accuracy and delicacy, and trains his judgment to rely
nd to discover the fallacies and sources of mistake which embarrass
omed observer. He learns the precautions needful in planning and
an experiment, acquires confidence in truth, and arrives at a just
his powers of perceiving and appreciating facts. The discipline and
iinable in this way repay a thousand-fold the time and labor expended
ratory, though the student might have but little actual use for his
acquirements in after life. A person of ingenuity would, however,
i directly beneficial to him; would fall into habits of experimenting
not fail to make him useful in advancing practical knowledge; would
e, for instance, to study the problems of the manure-shed and feeding-
h results of high value to himself and the world.
course.—To meet the wants of those who have not time to attend the
, and especially to accommodate young farmers who cannot leave
pations during the summer months, the instruction is so arranged that
important practical topics, viz., practical agriculture, agricultural
and physiology, agricultural zoology, physical geography, forestry,
scussed during the fall and winter terms of each year, (September
. 12, with vacation of two weeks, from December 19 to January 3.)
desire can thus attend, during seven months of the year, the shorter
ng such a selection of the most useful exercises from the studies of
irse as will occupy their time profitably.
dents.—Arrangements have been made by the State of Connecticut
ng to the school a certain number of pupils gratuitously. According
, all candidates for this bounty must be citizens of the State, and
will be given to such as are "fitting themselves for agricultural and
or manufacturing occupations, who are or shall become orphans
e death of a parent in the naval or military service of the United
next to them to such as are most in need of pecuniary assistance."
itments are to be distributed, as far as practicable, among the several
the State, in proportion to their population. The appointing board
the governor, lieutenant governor, and three senior senators, with
ry of the school, Professor Brush, to whom applications may be

KENTUCKY.

ih iblished the agricultural and mechanical college as one
o n Kentucky University, recently removed to Lexington.

We learn through private sources that by private enterprise a magnificent of about 430 acres, including Ashland, the home of Henry Clay, adjoining residence, with finely ornamented grounds, has been already pu for the agricultural college, and that students will be received in the 1866. The college, though connected with the university, will have a s government, availing itself, however, of the aid of professors in other ments. Already about $250,000 has been procured for the college, and has granted its land scrip for 330,000 acres to the institution, on condit three students from each of the one hundred representative districts be e there free of tuition.

NEW YORK.

Mr. John Delafield and others, Ovid, New York, as early as 1853 p a charter for an agricultural institution to be established at that place, name of the New York State Agricultural College. About 700 acres were purchased, and buildings erected sufficient to accommodate 150 st In a report of January, 1860, it is said that a president had been and earnest calls were made upon the public to subscribe the funds ne for opening the college for students. It appears that the institution operation two terms, when, upon the breaking out of the rebellion, the p: was called to the field, and the college was closed.

For some reason not publicly explained, the legislature of New York granted the avails of the grant of Congress, not to the State agricultural but to the people's college at Havana; but, by a subsequent act o granted the same to the Cornell University, to be received upon certain tions, unless the people's college should comply with certain other co which, it appears, have not been complied with. The principal conditio grant to the Cornell University was, that Mr. Ezra Cornell should fi offer to give the university $500,000. This he has done, and the instit to be established at Ithaca, the place of Mr. Cornell's residence, wh acres of land have been secured and preparations are making for buildi where, it is hoped, the agricultural college of New York may find a pe abiding place.

NEW JERSEY.

The legislature of New Jersey has granted to the Rutgers Scientific connected with Rutgers College, the income of her land scrip, to be to the uses specified in the act of Congress.

Although the income of the scrip sold was estimated at only $1,200 year 1865, eight pupils were received on the 20th of September, suitabl and instruction being provided at the college. A farm of 100 acres h purchased for about $15,000, said to be conveniently located, though distance from the college does not appear. Provision is made fo students, to be received on nomination by the respective counties, tuition fees, and an excellent course of study, which want of space con to omit, has been established. This experiment, as combining a uni another college and an experimental farm, will be watched with pec terest. It has at least the merit of economy and speedy organization.

VERMONT.

The legislature of Vermont has decided to unite her agricultural coll the University of Vermont, at Burlington. The plan of organization is tially the same as that of Massachusetts, already given. It is prop have a farm of 150 acres or more, with stock and implements for illu l experiment.

KANSAS.

The Kansas State Agricultural College, formerly the Bluemont College, "opened under the auspices of the State in September, 1863," (says the superintendent of public instruction,) "and has been doing a great and good work in the education of teachers, and in training young men and women for active business life, and also in fitting them to graduate from the highest course of a first-class collegiate institution." A president and four professors are employed, and the number of students was 113, as shown by the catalogue of 1865. The ages of the students range from 9 to 27 years, there being a large preparatory class. The college is at Manhattan, and has 80 acres of land, a college building, and the foundation of a library. The annual expenses are estimated at only $4,000 a year. A boarding-house is about to be erected, and the institution, now in its infancy, has large prospective means. It is believed to be the only agricultural college where females are instructed. We have not at hand any definite programme of its course of study.

MAINE.

After much discussion, the agricultural college of Maine has been located at Orono, and is to be conducted as an independent institution. No buildings have yet been erected, and no plan of organization has been published.

So far as can be learned, no other agricultural colleges than those above noticed have yet been established. The Maryland Agricultural College, established as early as 1857, and still in operation, has a farm attached, but is rather a school of general education than of agriculture distinctively.

THE MECHANIC ARTS.

The act of Congress provides that colleges maintained by its provisions shall teach, not only such branches of learning as are related to agriculture, h as are related to the mechanic arts.

Massachusetts has granted the income of about one-third of her fund to the Institute of Technology, where the mechanic arts receive special attention, and her agricultural college is therefore regarded as released from obligation to teach the mechanic arts, further than they are essential to agriculture.

A good water-power, with shops of various kinds, or steam or caloric power for want of water, are greatly to be desired connected with every agricultural college. The act of Congress calls for earnest attention to the department for instruction in the branches related to the mechanic arts, which seem to have been nearly overlooked. It is hoped that the subject may receive due consideration in the organization and progress of these institutions.

We close our paper with the following conclusions:

1. Public sentiment and the public good require a more practical course of ducation than our literary colleges afford, with more attention to modern and to ancient languages.

2. Colleges established under the act of Congress should "teach such branches f learning as are related to agriculture and the mechanic arts," both scienfically and practically, so as to prepare their students to labor and to teach in e highest branches of their respective pursuits.

3. If the means are sufficient, these colleges should be independent, and not ited with existing colleges.

4. But one such college in a State should be established. Experimental rms or stations, or subordinate schools, may be organized in counties or disicts.

5. Manual labor for practice and education is essential to education in agriculre, and should be required of all students in colleges which have farms attached.

6. Farms for experiment, illustration, and practice, with live stock and farm implements, are essential to strictly agricultural colleges.

7. Where means for independent institutions are wanting, a half-year system of study in winter, and labor at home or on an experimental farm in summer, is practicable.

8. The promotion of equality, and the dignity of labor, being principal objects in our government, we find no models for our agricultural colleges in the aristocratic communities of Europe.

POPULAR VARIETIES OF HARDY FRUITS.

BY F. R. ELLIOTT, CLEVELAND, OHIO.

The following is a continuation of articles descriptive of fruits, published in the reports of the Department of Agriculture for 1862, 1863, and 1864:

APRICOTS.

LARGE EARLY.

Synonyms.—Gros Precoce, De St. Jean, De St. Jean Rouge, Gros d'Alexandre, Gross Früh, Precoce d'Esperin.

Fruit.—Size—medium to large. Form—roundish, oblong, compressed, projecting considerably on the side of the suture. Suture—deep, and terminating in a projecting point towards the back or beyond the axis of the fruit. Skin—downy. Color—pale orange in the shade, fine bright orange red, and marblings or spots of deeper red in the sun. Flesh—pale orange, separating freely from the stone; juicy, rich. Stone—much flattened, oval, sharp on the front, perforated along the back, from base to apex. Kernel—bitter. Season—early in July.

Tree.—Of vigorous growth, with large, broad oval leaves, tapering towards the footstalks or petiole, and with little ear-like appendages in place of glands. An abundant bearer, an old variety from France, and one of the very best early sorts known.

APPLES.

DUCHESS OF OLDENBURGH.

Fruit.—Size—medium to large. Form—roundish, flattened. Skin—smooth, with a light bluish bloom. Color—light and deep rich red, washed, striped and splashed on a yellow ground. Stem—short. Cavity—acuminate. Basin—deep, wide, even, regular. Calyx—large, nearly closed. Flesh—slightly yellowish white, sharp sub-acid, juicy, and, when well ripened, pretty rich. Season—September, and often keeping into October.

Tree.—An upright, vigorous, hardy and healthy grower, with dark-colored shoots and broad, dark-green, coarsely serrated leaves. A profuse bearer, apparently adapting itself to all soils and situations, and yielding a fruit of great value for marketing and for cooking purposes. It is of Russian origin.

FAMEUSE.

Synonyms.—Pomme de Neige, Sanguineus, Snow.

Fruit.—Size—medium. Form—roundish, somewhat flattened. Skin—smooth. Color—a greenish yellow ground, mostly overspread in the sun with a clean rich red; in the shade the red is pale, streaked, and blotched with the dark-red. Stem—slender. Cavity—narrow and funnel-shaped. Calyx—small in—narrow and shallow. Flesh—remarkably white, tender, juicy, negative

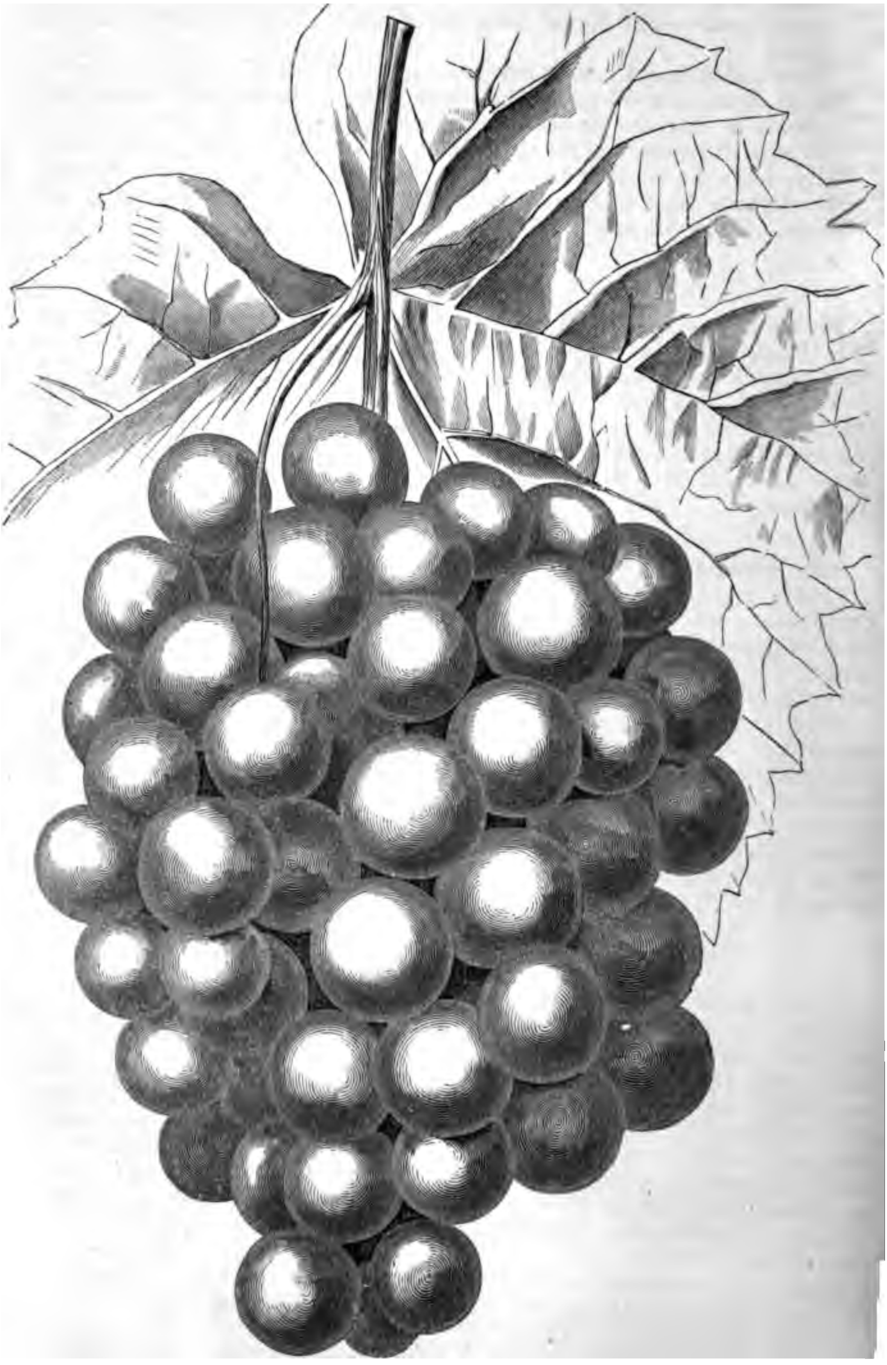
PLATE II.

LARGE EARLY APRICOT.

"DUCHESS OF OLDENBURGH."

"FAMEUSE."

"GREAT BIGARREAU OF MEZEL."



"DIANA."

aracter, but deliciously pleasant, with a slight perfume. Core—close, small, mpact. Seeds—light brown, long and pointed. Season—October and to ecember.

Tree.—Hardy, healthy, moderate grower, of a rather diverging habit, with ark-colored shoots and long narrow leaves, bearing annually a fair crop, with profusion in alternate years. A rich but dry or well-drained soil seems to uit it best. No orchard in the north can be counted as complete without this variety; for while its fruit is not of the highest character, it is just so good that everybody likes to eat of it; and when cooked, it is white, puffy, and delicious. Of French origin.

CHERRIES.

LOUIS PHILLIPPE.

Fruit.—Size—medium. Form—roundish, slightly oval. Color—dark, rich red. Flesh—red, tender, juicy, sprightly, lively acid. Pit—small. Stem—short to medium. Season—rather late, say middle of July.

Tree.—Of the morello class, quite vigorous, and forming a good-sized tree, with sharply serrated, broad, oval-shaped leaves; an abundant bearer of a fruit that has no equal for canning purposes, and when fully ripe is very fine for the table. It is worthy a place in all collections, however small they may be. Of French origin.

GREAT BIGARREAU OF MEZEL.

Synonyms.—Monstreaux de Mezel, Bigarreau Gaubalis.

Fruit.—Size—very large. Form—obtuse, heart-shaped, flattened on sides. urface—uneven. Color—dark reddish purple, becoming apparently quite lack at maturity. Stem—long, rather slender, in a rather deep and regular avity. Pit—large, oval. Flesh—purplish red, firm, a little coarse, juicy, sweet nd good, but not of the highest flavor. Season—last of June and early in July.

Tree.—A strong, vigorous grower, rather crooked while young, becoming at ature age a broad, open, spreading tree, with large leaves, and producing undantly a fruit that commands the highest price in market. It is possible e Great Bigarreau or Large Red Prool may be identical, but as there is some estion of it, we have omitted the names in our synonyms. The tree is of ench origin, and came to this country with a loud flourish of trumpets. hile young it is not a great bearer, but when the trees have acquired some elve or more years of age they are good and regular bearers.

GRAPES.

DIANA.

Fruit.—Bunches—medium, very compact, occasionally shouldered. Berries—ove medium size, round, pale red. Skin—thick. Flesh—tender, with some p, very sweet, juicy, with a rich musk flavor that is very strong until the it is fully ripe, and then often offensive to some persons. It colors its fruit early as the Concord, but, as a rule, does not really mature it much earlier n the Catawba. Its berries hold well, and its thick skin enables it to withstand nges of temperature better than thin-skinned; hence the Diana improves by ng left upon the vine until after pretty severe frosts. As a variety for pack- and keeping it has no superior. For wine purposes many claim it to be very uable; our impression is that it has too much of the foxy character to ever ke a very fine white wine. A dry and poor gravelly soil suits it best; on p rich soils it inclines to make too much wood. It was grown from seed of Catawba by Mrs. Diana Crehore, Milton, Massachusetts.

IONA.

Fruit.—Bunches—medium or above. Berries—above medium, yet not large, ly and evenly distributed on the bunch, which may often be termed double-

shouldered. Color—handsome pale red or wine-color, almost transluce Flesh—melting to the centre, highly flavored, juicy, sweet, vinous. Skin—tl and tender, with little or no coloring matter, except in the outer cortic Seeds—few and small. It ripens about with the Concord, while its qual more nearly compares with a fully ripened Catawba than any other sort. T vine is a healthy grower, with rather short-jointed wood, broad, three-lobed lig green foliage, that in most sections at the north has not mildewed; but Missouri it has not sustained a favorable character, and may prove valua only for northern sections. It originated with C. W. Grant, of Iona islaı New York, probably from a seed of Catawba.

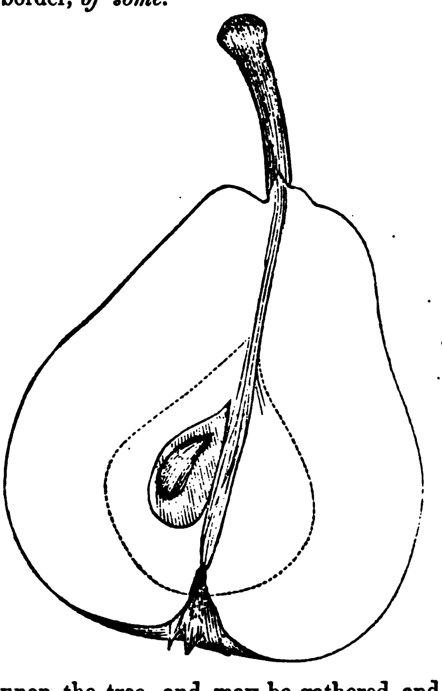
ROGERS NO. 4.

Fruit.—Bunches—large; very compact. Berries—very large, round, blac with a thick, blue bloom. Skin—rather thick. Flesh—with some pulp; me ing, juicy, sweet, sprightly vinous, sub-acid. Ripens with the Concord, to whi it is superior in quality. The vine is a vigorous, strong grower; an early a good bearer, and quite hardy and free from disease of mildew. This, with N 15, which we figured in the Department Report for 1863, will undoubtedly the most valuable of many seedlings originating with Mr. E. S. Rogers, of Sa Massachusetts. The leaves are broad and dark green, five-lobed, ex strongly the native fox grape, claimed as its female parent.

PEARS.

BEURRE D'AREMBERG.

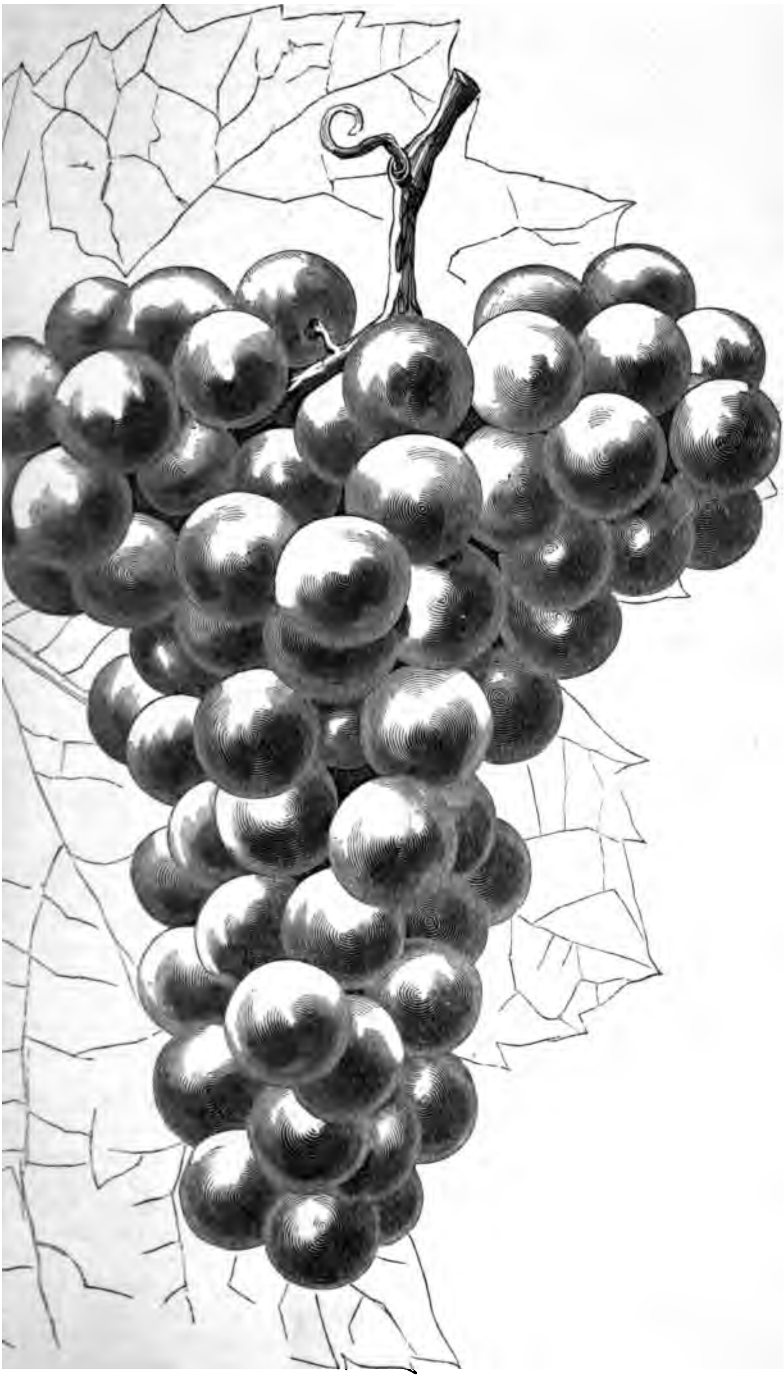
Synonyms.—Duc d'Aremberg, Colmar Deschamps, L'Orphelines, Deschan D'Aremberg Parfait, Beurre des Orphelines, Orpheline d'Engheim, Soldat L border, *of some.*



Fruit. — Size — above Form—obovate, obtuse pyriform, ta pering toward the stem, where often terminates in a fleshy junctio Color—dull, pale green, becoming maturity a light yellow, clouded wi green, and with traces and patches light cinnamon russet. Stem—sho stout; sometimes with, but often without, depression. Calyx—sma with short, closed segments. Basin- full medium depth. Flesh—whi juicy, melting, vinous. Core—me um. Seeds—light brown, acute pointed. Season — December March.

Trees.—Very hardy; commenci to bear early, even when grown on t pear root; a good, healthy grow with long-jointed wood of yellowi brown color, dotted with pale gr specks. Leaves—narrow, shar and finely serrated. A warm, ri yet loose soil, seems to suit this ety better than heavy clays. It good bearer, the fruit hanging w upon the tree, and may be gathered and packed in barrels, as with apples, be brought into a warm room and ripened as desired, from time to time. It Belgian origin, and has often been confounded with Glout Morceau.

Plate VII.



"IONA."

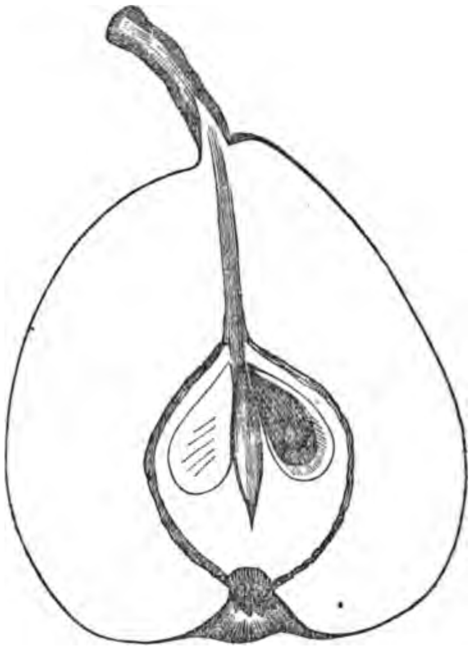
PLATE VIII.

"BEURRE D' AREMBERG."

"BEURRE COIT."

BEURRE COIT.

Fruit.—Size—above medium. Form—obtuse pyriform; slightly angular. Color—rich brown russet, mostly overspreading a yellow ground, with a brownish red cheek in the sun. Stem—rather short, with an occasional lip-like at its junction with the fruit. Cavity—shallow, with unequal projections. Calyx—with segments nearly erect, surrounded by depressed, crescent-shaped furrows, in a shallow basin. Core—small. Seeds—blackish. Flesh—yellowish white, melting, buttery, juicy, sweet, vinous. Season—last of September and in October.

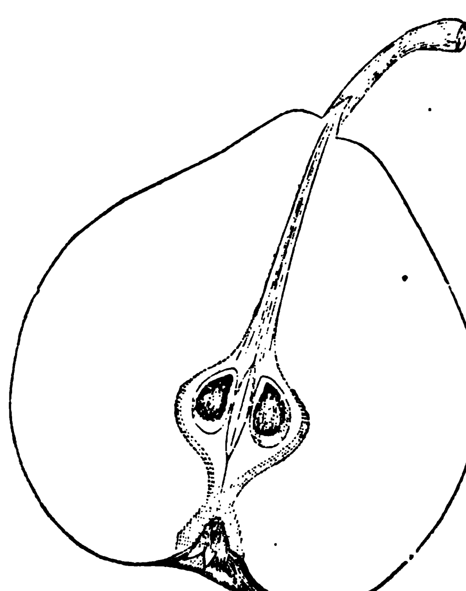


Tree.—Hardy, vigorous, upright grower, becoming spreading as it matures, with dark-brown shoots, and broad waved leaves, with rounded serratures. The tree is productive, and comes early into bearing on the pear roots. It originated with Colonel H. H. Coit, of Euclid, Cuyahoga county, Ohio, and is of such excellence as to deserve a place in all collections.

Our outline drawing was made from a small specimen, while our shaded drawing was from a full-sized fruit.

KIRTLAND.

Synonyms.—Seedling Seckel, Kirtland's Seedling, Kirtland's Beurre.



Fruit.—Size—medium, or a little above. Form—obovate, obtuse pyriform. Color—a rich, deep yellow, overspread with cinnamon russet; in the sun many of the russet spots become almost red. Stem—usually stout; of medium length; curved. Calyx—short, reflexed, persistent. Basin — shallow. Core — small. Seeds — short, ovate, blackish. Flesh—white, melting, juicy, sweet, aromatic. Season—September.

Tree.—An upright grower, with short-jointed, stout, yellowish-brown shoots, and irregularly l sharply serrated leaves, with ut petioles; a hardy, healthy rt, partaking in its habits very h of its parent, the Seckel,

from seed of which it was grown by H. T. Kirtland, of Mahoı Ohio. It is an early and productive bearer on the pear root, a admirably on the quince.

DOYENNE SIEULLE.

Synonyms.—Bergamotte Sieulle, Beurre Sieulle, Sieulle.

Fruit.—Size—medium to large. Form—roundish, a little im pressed, and tape toward the stem. yellowish green, ded and marbled red on the sunı with many large set specks. Steı dium length, plaı cavity, sometim appearance as of on one side. broad reflexed Basin — shallow white, melting, j Core—large. dark brown. vember to Janua

Tree.—A vigo rather compact moderately stout jointed wood, of olive color, an speckled with l white specks. Lea slender petioles, ovate acuminate, waved and finely serrated, of French origin, known, does not seem to have received the attention that it deser because its fruit at the usual time of exhibitions in the fall is again, is gone before midwinter shows. The tree on the quince r the best growers and bearers in the whole collection, and it ripeı the earlier varieties of fall pears are about gone.

PLUMS.

REINE CLAUDE DE BAVAY.

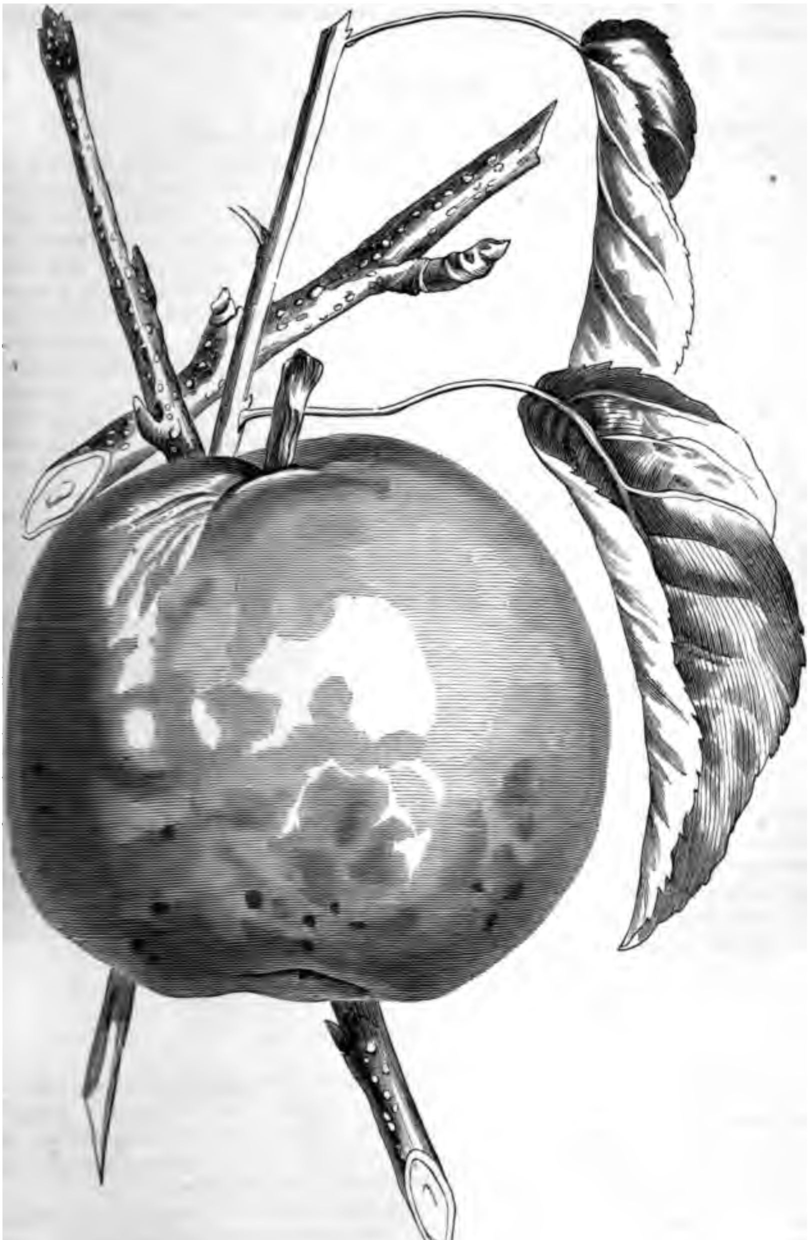
Fruit.—Size—large. Form—roundish, oval, oblong. Color— low, with stripes and splashes of green, covered with a thin bloo medium, apex dimpled. Stem—short and stout, planted in a cavity. Flesh—yellow, sugary, juicy, rich, excellent. Stone— which the flesh separates freely. Season—early in October.

Tree.—A vigorous grower, with smooth branches, large, broad, ov pointed leaves, with rounded irregular serratures; very producti origin, and a valuable acquisition to late ripening varieties.

PRINCE'S YELLOW GAGE.

Synonyms.—American Yellow Gage, White Gage, Harvest Gag

Fruit.—Size—above medium. Form—oval, broadest near the stal



"DOYENNE SIEULLE."

"REINE CLAUDE DE BAVAY."

"PRINCE'S YELLOW GAGE."

line. Color—golden yellow, a little clouded. Bloom—white and t. Flesh—yellow, sugary, rich, sometimes a little dry, separates the stone. Stem—about one inch long, set in a small round cavity. the north early in August, at the south about middle of June, where to become quite juicy and to ripen gradually, thus forming one of the luable varieties. At the north its hardiness and productiveness, to-ith its rich sugary character and fine show, make it indispensable in cet orchard.

—A healthy grower, with short-jointed, smooth branches, glossy leaves, ing a large spreading head.

'EACH—ITS PROPAGATION, CULTIVATION, VARIETIES, ETC.

BY ISAAC PULLEN, HIGHTSTOWN, NEW JERSEY.

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delicious fruit justly claims a large share of attention, not only among ho are greatly benefited by its cultivation, but by those who have only plot of ground to devote to fruit. The ease with which it is raised, its is return for the slightest attention, and its unequalled flavor, render it he most desirable fruits for the orchard or garden. It is proposed in this to state briefly a few facts, gathered from a long experience, as to its ation, cultivation, varieties, &c.

PROPAGATION.

the selection of seed it is desirable to procure it from localities where s have not made their appearance. For a number of years the best seed ket was procured from Accomac, Virginia, and other counties on the la, where almost all the trees were seedlings. In the preparation of the or planting, the usual custom with nurserymen is, in the month of October, a space of ground, excavate to the depth of three inches, fill this exca-with the stones, and cover over with earth about two inches in depth. protection against too severe freezing in the winter, some boughs, or stalks, r may be thrown over the whole. In the spring, as early as the stones to open with the swelling kernel, the bed may be opened and the kernels ally gathered and planted, in rows four and a half feet apart, and at a e of about four inches from each other. The stones that have not n may be cracked with a hammer, and the kernels planted in the same r.

i and cultivate the young seedlings until they are of proper size for which will be about the 10th of August or earlier, according to . Buds are generally chosen from thrifty orchard trees of three or four growth, as being better matured than those taken from one-year-old trees ery rows. The operation of budding is simple; an expert hand setting as two tho l in a single day. The bud is cut about one inch in , eye l in the middle. The bark will very readily cleave from oon. , in cases where the bark of the budding limb is free, the plan wood is preferable. A slit, corresponding in length in the seedling, as near the ground as possible, and the

bud inserted, where it is made secure by being wrapped about with strands of Russia mat, or other convenient wrapping material, care being taken to leave the eye of the bud exposed. In a few days the bud will have adhered to the wood of the tree, when the wrapping may be removed. Early the following spring the seedlings should be cut off as near to the bud as it can be done without injury—say one-half inch above it. Then, for the six weeks following, the stump which is left must be kept clean from suckers, so that the growing bud may have the benefit of the strength of the root. By the falling of the leaf the inoculation will have attained the height of four to six feet, according to the soil. It is not desirable that the trees should be grown in highly manured ground, or that they should attain a large size the first year.

PLANTING, CULTIVATION, PRUNING, ETC.

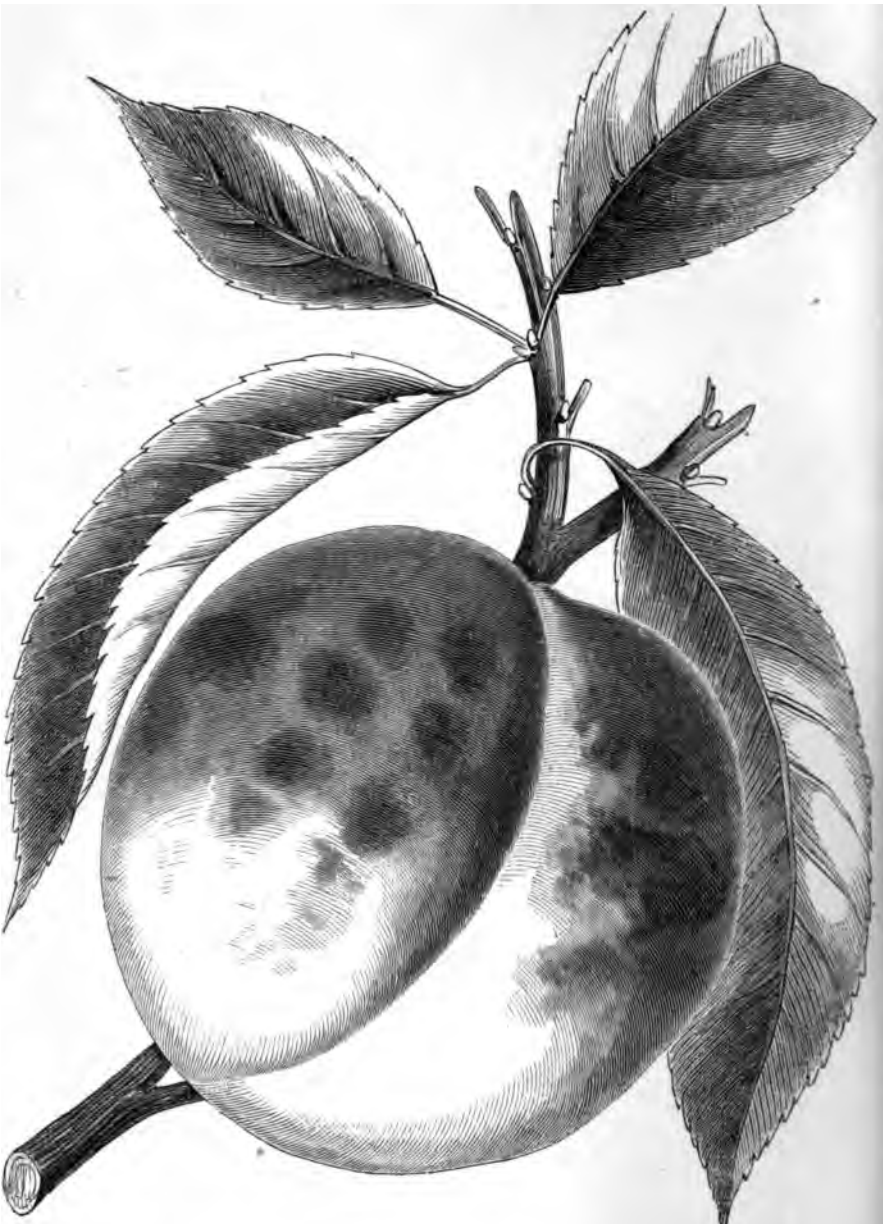
In all cases, peach trees should be planted when of one season's growth. The time of planting, whether fall or spring, is immaterial. In very severe climates, the spring would be preferable; but in all the peach-growing belt of the United States, the choice between fall and spring planting is of little account. For orchard planting, the ground should be marked out in furrows, about eighteen or twenty feet apart, and the trees planted to about the same depth as they stood in the nursery. The side limbs and tops should be cut off, leavi straight stem of the desired height for forming a head. If the trees are plann in the fall this trimming and topping should be deferred till spring. Low hea are desirable. When the heads begin to form proper care should be taken prune out all unnecessary limbs, leaving three or four limbs in proper posit to form the future tree. Shortening in about one-half the growth for the sec and third years after planting, and keeping the inside of the trees clear of less growth, is all that is required in the way of pruning before the trees con bearing. The borers, which enter the body of the tree at or a little below t ground, should be removed from year to year. Many remedies for their prev have been recommended, but experience has demonstrated that the best preven is personal inspection of each tree, and removing with a knife, or other sui instrument, the borers. Peach trees will succeed in any soil that will grow c or potatoes, and require about the same cultivation as those crops. No i are required until the trees have borne their first crop. After the first crop hundred bushels of wood-ashes, or three hundred pounds of Peruvian gua four hundred pounds of some standard super-phosphate, or four hundred pc of bone-dust, to the acre, will restore the trees and prepare them for the i year.

VARIETIES.

Among the hundreds of varieties which have been cultivated, and which s the columns of nurserymen's catalogues, there are about twelve which s suffice for general cultivation. Those varieties, which I shall recommena possessing the qualities of fine flavor, succession in ripening, hardy growtl tree, and general fruitfulness, have been tested by me through a long and cessful experience in the cultivation of the peach, with the exception of the I Early, which is of recent origin. This latter variety has been fruited by three years, both in the orchard-house and in the open air. In each has been fruited side by side with the Troth's Early Red, which latter ha years held the position of the earliest market variety. The Hale's Early ri at least two weeks in advance of the Troth's. It is larger, of fine flavor, promises to be one of the most valuable and profitable additions to our list, since it increases the length of the peach season by two weeks. In to fill up a gap between the Hale's Early and Troth's I am now e producing a new variety by hybridizing.

PLATE XIV.

"HALE'S EARLY."



"TROTH'S EARLY RED."

"LARGE EARLY YORK."

"YELLOW RARERIPE."

"STUMP THE WORLD."

"CRAWFORD'S LATE."

LIST OF VARIETIES FOR GENERAL CULTIVATION, GIVEN IN THEIR ORDER OF RIPENING.

Hale's Early.	Yellow Rareripe.	Crawford's Late.
Troth's Early Red.	Oldmixon Freestone.	Ward's Late Free.
Large Early York.	Reeves' Favorite.	Smock.
Crawford's Early.	Stump the World.	Heath, (cling.)

These varieties will afford a succession of fruit from the beginning to the end of the peach season. I attach descriptions of each:

HALE'S EARLY.—A new and valuable early peach; vigorous and healthy tree, and an abundant bearer. Fruit—medium size, nearly round. Skin—mottled red, with dark red cheek. Flesh—white, melting, juicy, and high-flavored. Glands—globose. Flowers—large. Season—last of July, and first of August. Freestone.

TROTH'S EARLY RED.—Fruit—small, round, uniformly red. Flesh—white, slightly red at the stone; not of first quality as to flavor, but one of the most valuable market varieties on account of its early ripening. Glands—globose. Flowers—small. Season—1st to 15th August. Freestone.

LARGE EARLY YORK.—This truly excellent peach is known by many names, as Livingston's New York Rareripe, Honest John, New York Rareripe, ...name's Early Red, Walter's Early, &c. Fruit—above medium, roundish. Skin—whitish, dotted with red, with beautiful red cheek. Flesh—white, very juicy, and of excellent flavor. Season—middle of August. Flowers—small. Glands—globose. Freestone.

CRAWFORD'S EARLY.—A very popular, yellow-fleshed variety. Fruit—large, generally oblong, but variable as to shape. Skin—yellow, with red cheek. Flesh—yellow and juicy, and slightly acid. Flowers—small. Glands—globose. Season—last of August. Freestone.

YELLOW RARERIPE.—A variety ripening at nearly the same time as the Crawford's Early, and much esteemed on account of flavor. Fruit—large, roundish, the suture extending half-way round. Skin—orange-yellow, with rich red cheek. Flesh—yellow, but red at the stone. Flowers—small. Globose glands. Freestone.

OLDMIXON FREESTONE.—An old and highly esteemed variety. Fruit—...ge, roundish, a little swollen on one side. The skin is pale, dotted profusely, ...th a beautiful cheek. Flesh—white, tender, and very rich. Flowers—small. ...lands—globose. Season—first of September.

REEVES' FAVORITE.—Fruit—large, roundish, slightly oval. Skin—yellow, ...ich red cheek. Flesh—deep yellow, red at the stone, rich and melting. ...lands—globose. Flowers—small. Season—10th to 15th September.

STUMP THE WORLD.—Fruit—large, slightly oblong. Flesh—white, red ...ek, of excellent flavor. Ripens about the middle of the peach season, just ...lowing the Oldmixon Freestone, which it closely resembles in size, appearance ...d flavor. Flowers—small. Glands—globose.

CRAWFORD'S LATE.—This has no rival as a yellow-fleshed variety. Its large ..., beautiful appearance, and unapproachable flavor, make it a deserved favorite ...ong growers. Fruit—large, roundish, with shallow suture. Skin—yellow, ...th dark red cheek. Flesh—deep yellow, and red at the stone. Glands—...bose. Flowers—small. Ripens from middle to last of September.

WARD'S LATE FREE.—A fine, white-fleshed, productive variety. Skin—...hite, with crimson cheek. Flesh—white, slightly red at the stone, excellent ...vor. Flowers—small. Glands—reniform. Season—last of September. Free...ne.

SMOCK.—A well known late variety, very productive, and valuable as a ...t peach, on account of its bearing transportation. It is also a favorite for

domestic purposes for pickling, preserving, &c. Fruit—large, oblong. Skin—light-yellow, mottled with red, with red cheek when ripened in exposed place Flesh—yellow, but red at the stone. Glands—reniform. Season—last September and 1st of October. Freestone.

HEATH.—A clingstone variety, of most delicious flavor. Fruit—large, ol long, narrowing to both ends, with distinct suture on one side. Skin—whitis but slightly tinged when grown in exposed places. Flowers—small. Glands—reniform. Season—from 1st to 10th October.

Another list, combining, in many respects, qualities common to the abov might be made; but on the whole I consider the list given as possessing mo qualities for commendation than any other.

Peach-growing, as an industrial pursuit, is steadily increasing. With tl opening by expresses and otherwise of such markets as Boston, Albany, Tro Portland, New Haven, Buffalo, and all considerable towns and cities north New York, the demand has been so much increased that when peaches are ceived in fair condition in New York, no such gluts as distinguished that mark some years ago, when this fruit was thrown into the dock by boat-loads, a known. At present the eastern market receives the main supply from t Peninsula, bounded by the Chesapeake bay on the west, and the Delaware b on the east. This comprises the State of Delaware, and a portion of the Stat of Maryland and Virginia; but the greater part of the supply comes from tl State of Delaware. The extension of the Delaware railroad from Wilmingto south, through the whole length of the State, and through some countie Maryland south of Delaware, and the running of a through train during the peac season to Jersey City, has opened up one of the finest peach-growing districts i the United States, to one of the best markets. In the summer of 1864 ther were received at Jersey City, by the Delaware peach train, three hundred an thirty-five thousand (335,000) baskets of peaches. Add to this about one hun dred thousand (100,000) by Adams's express, and three hundred and sixty-eigh thousand one hundred and eighty (368,180) by the Camden and Amboy railroa (the greater part of which were Delaware peaches re-shipped at Philadelphia making the amount received in New York city from the Peninsula eight hu and three thousand one hundred and eighty (803,180) baskets. The r during 1865, from the same source, amount to over that number. New Jerse during the above year, furnished about half as many baskets as the Peni for the New York market. In the west, the great markets of Cincinnati, L ville, Chicago, St. Louis, &c., have stimulated peach-growing to a great ex so that in certain portions of Ohio, Indiana, and Illinois, this pursuit has be a great source of wealth.

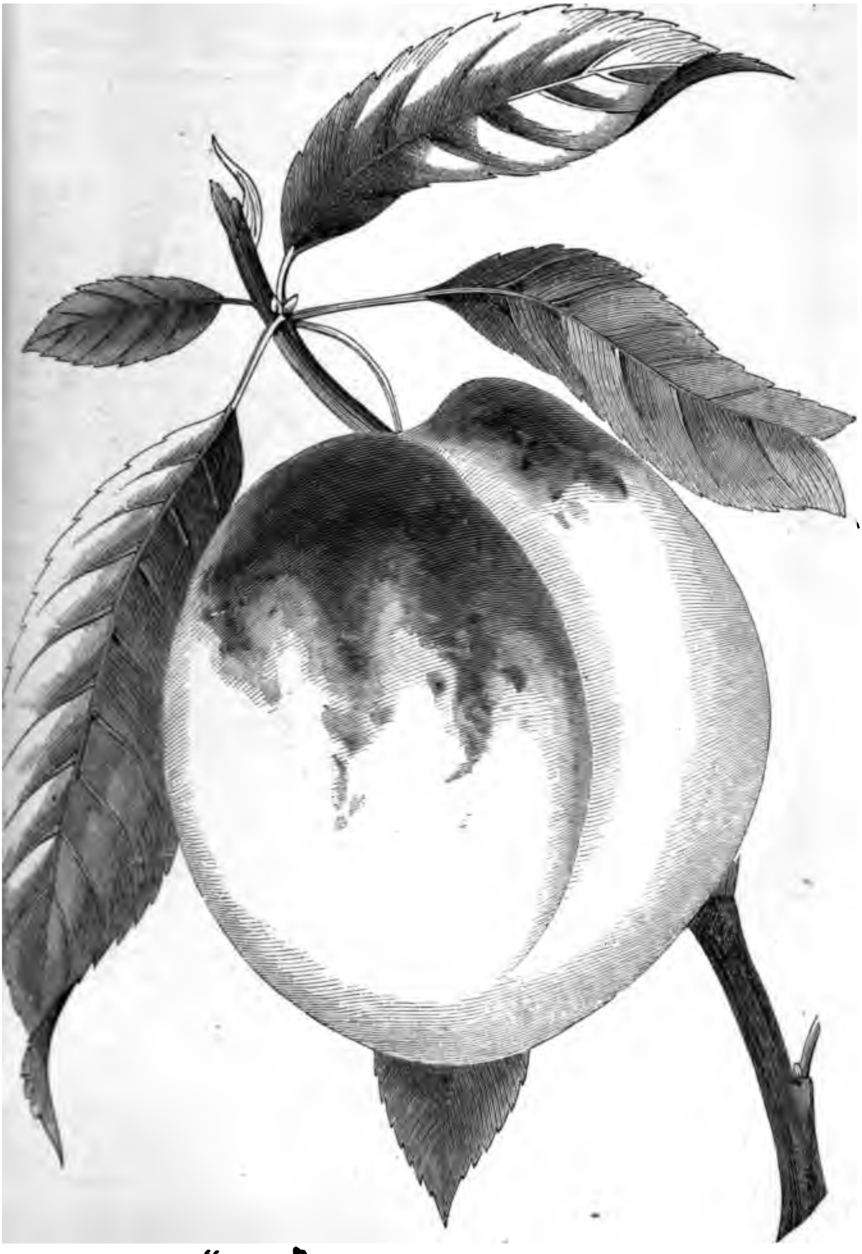
NEW VARIETIES OF GRAPES.

BY S. J. PARKER, M. D., ITHACA, N. Y.

In this brief article I wish to notice a few grapes either entirely new, or receiving public approbation, but hitherto neglected; and even yet comparativ unknown. Perhaps no new grape is, at the present moment, more largely tivated, or better proven, than—

IVES'S SEEDLING. It was found a chance seedling growing in the garden H. Ives, esq., of Cincinnati, Ohio; and he being at that time secretary of Cincinnati Horticultural Society, introduced it to its members and gave cutti to them. These fell, among others, into the hands of Mr. Waring, George G ham, esq., and Dr. Kittredge, who are, if my information is correct, with

PLATE XX.



"HEATH'S CLING."

Ives, to be accredited for the proving of this valuable grape, and announcing it to the public.

Various conjectures have been made as to the parentage of this new and excellent vine. At one time Mr. Ives attributed it to the Madeira, just as too many give foreign-birth blood to every good fruit. But its wonderful resistance to the rot and mildew of Cincinnati proves it to be eminently native. Others, of whom the intelligent George Graham, esq., is one, see the characteristics of the Hartford Prolific in it. But the fact that "it so closely resembles the Hartford Prolific as not to be distinguishable from it, except by its clusters," as says Mr. Washburne, of Illinois, is no reliable proof on this point, in my opinion. Mr. Graham says, in almost the identical language just given, it "is probably a seedling from the Hartford Prolific, as the vine bears a strong resemblance to that variety, and can be scarcely distinguished from it, except in time of ripening and coloring, which, in the Ives, is much earlier than the other."

It has also been attributed to the Concord and other seed. Its parentage can never be certainly known. and hence we must take it as it is. Its history (since its discovery and the distribution of cuttings to the gentlemen named) is this: Mr. Waring, "who is a cultivator of grapes," first made wine of it, but was, on the first trial, not very successful. So vigorous was its growth, so excellent its habits, that he multiplied his vines. "Dr. Kittredge, his neighbor, also, about the same time, made wine of it; his grapes being fully ripe." Eminent success attended the Dr.'s experiment, as his wine proved to be a red wine, similar to a fine Burgundy. This seems to have confirmed our Cincinnati grape friends, so given to wine-making, in their estimate of the value of this grape.

Mr. Waring, in 1863, had two acres in fruitage, and Mr. Graham informs me that "the two acres, in 1863, 1864, and 1865, suffered very little from rot or mildew, and produced 450 gallons of wine to the acre, *in those seasons when the Catawba and other grapes were a failure.*" Here I take occasion to say, that I would not have the American or European reader of these pages suppose, because certain writers at Washington, Philadelphia, Cincinnati, and elsewhere, constantly make *mildew* and *rot* the *test of value* in a grape, that therefore all our citizens necessarily have the same rule. I live in the Cayuga valley, where *rot* in *red* grapes does occur to some, and at times to serious, extent. But mildew is never to be complained of. Such are most grape regions in this country, so entirely free, that wherever mildew is named, the *bias* of the writer's locality must be [taken] into consideration as an exception to the general rule. But the resistance of Ives's Seedling to the evils of the Cincinnati locality is high praise of it, as it promises to become, at no distant day, *their wine grape.* The wine made of Ives's Seedling "in 1864 sold for \$4 50 per gallon." The vintage of 1865 was worth more. "Wines of Catawba and other natives were not worth more than \$2 per gallon" at the same time.

Description.—Ives's Seedling is a large, dark purple or black grape, growing a medium to a large bunch, beautifully compact and neat in its appearance. It contains much sugar and a fine, high aroma. The vine is very vigorous, "the stock strong, and producing canes of one-year's growth sometimes twenty feet long." The leaf is hardy and resists the attacks of insects and disease. General appearance resembles the Hartford Prolific, but is more free in its growth, and earlier, prolific, and more profitable.

George Graham, esq., whose words I have quoted so often, says: "I have [ana]lyzed this wine, which is a very popular wine with the Germans of our city, [and] consider it one of our best native wines. The wine of 1864 contains 13½ [deg]rees of alcohol. The must in the press-room averaged about 86 degrees. [The] wine is a beautiful claret color, delicate in flavor, and by many considered [equ]al to fine Burgundy." Such being its character, by the testimony of such [men] as I have quoted, this vine will be widely diffused and proven. A [goo]d red or claret wine is not a common American wine. Our northern

wines, whatever their color, easily lose it in the second fermentation. A re claret grape will fill a wide gap in our grape demand.

MILLER'S SEEDLINGS.

Next we name the seedlings of Samuel Miller, esq., of Camdale, near Avoı Pennsylvania. I had supposed the mountain-protected lands of Lebanon county Pennsylvania, peculiarly favorable to the grape. But in writing to Mr. Mille of the entire freedom of vines in central New York from mildew, I said that vine in the Cayuga, Crooked lake, or other valleys of New York, seriously in jured or entirely ruined by this disease, would be a curiosity; he replied, " have it by the cart-load." Such being the unfortunate locality of Mr. Mille on the latitude of mildew, the seedlings he has raised deserve the more notic by every one; and he the credit of perseverance, as well as of being one of seed planters of the vine.

One of the seedlings raised by him, less generally valued, but quite diffi everywhere, is

THE LOUISA.—This was grown from seed sent to Mr. Miller by Mr. Long worth, of Cincinnati, Ohio. It is considered by most as a mere common Isabell It certainly *is an* Isabella. Its value is realized only in those places where common Isabella fails to ripen to the delicious excellence which it attains w the writer lives. Where no Isabella will ripen, it is, of course, a failur Where the common Isabella is in its prime, it is not specially needed. But i that midway region I am pointing out, it is an acquisition, and good every where.

Description.—Louisa is a large grape, on a quite large bunch, more shouldere than the common Isabella, and its pulp less and sweeter. Well ripened cared for, it is a choice grape. The vine grows far more freely than its] n the Isabella, with larger and stouter roots.

MARTHA.—This is probably the best of Mr. Miller's seedlings. It was ol tained from Concord seed in the following manner: Soon after eating the Con cord, for the first time, Mr. Miller found himself reasoning in his own mind, " such a grape could be got, as Mr. Bull says, 'in the second generation' of wild fox-grape, will it not go on and improve still more?" He saved planted seed. Five plants survived the second year; were transplant good but unprepared ground, set about six feet apart, staked, and numbered II, III, IV, and V. In a few years numbers I and II bore a few berries, w "tasted good." The next season number I bore a crop that was admi t all who saw it. Number II bore a few berries, as it has since continued l but no sufficient crop; and on that account I fear it is not worth propaga Number IV also bore that year, and was a large, excellent black grape. S that time numbers III and V have fruited. Number III is a white grape \ promises well; number V a black, late grape, resembling, in color and the Concord, but three weeks later than its parent, and of course not as able. They have been named—No. 1, *Martha;* No. 2, *Eva;* No. 3, *M nia;* No. 4, *Black Hawk;* No. 5, *Young America.*

MARTHA, I named after Mrs. Miller, of Camdale, Pennsylvania. It is in its berry and bunch, more shouldered than the Concord; pale yellow, \ a delicate bloom; few seeds, and these small, no pulp worth the name, and many exclaim on eating it, "sweet as honey," with a fine spicy aroma; fectly hardy and healthy. It is, in a word, a white Concord, with all the cellencies of that grape, with merits of its own. Such being the case, its sion must be very extensive. It has, as yet, been proven in but few l those have further confirmed its value. No white grape on the whole American grapes stands as high in its reputation as this. If in the vi and garden, east and west, it sustains its reputation, then at last we m

white grape worthy the name; for the Rebecca, good as it is, is a mere dwarf in its growth; the Lydia, vigorous but comparatively tasteless; the Cuyahoga, one of the finest imaginable clusters, but late and insipid; the Spencer, small and flavorless; and others with equal faults. But Martha seems a tough, hardy, vigorous, sweet, early grape, just suited to the broadest domain of our grape lands. Its wine is also praised; for at the east, though the Concord makes a fair wine, we have yet to see a bottle of the highest wine excellence. Martha makes a delicate white wine, with aroma enough to be called by its admirers "superb." The vine loads itself with its fruit.

EVA.—This is No. 2 of Mr. Miller's five Concord seedlings. It is a white grape, admirable in quality. If Miss Eva will only become prolific, and decorate herself with fair and full clusters, she will have a name; if not, she is lost irrevocably.

MACEDONIA.—This is No. 3 of Mr. Miller's collection. It is said to be a large, early, fine white grape, less vigorous in its growth than the Martha, but promises well. This completes the white grapes of Mr. Miller.

Ephraim Bull, esq., of Concord, Massachusetts, and several other gentlemen, have also white Concord seedlings. They will confer a favor if they also let them be known.

BLACK HAWK.—This is Mr. Miller's No. 4. It is a large, black grape, fully equal in size to the Concord, its parent, and "a week earlier, and much sweeter." Its bunch is large, berry nearly round, vine perfectly hardy, remarkably vigorous, habits unexceptionable. It has the remarkable peculiarity that its leaf is so dark a green as to appear almost black. So far it has proved to be a Concord, with the Concord leaf intensified, a Concord grape slightly enlarged, and much improved.

If this latter sentence be true, then no more need be said. The Concord is one of the very best, if not the best, of all our grapes; and a grape larger, earlier, and sweeter cannot be praised—it can only be had, eaten, and enjoyed.

CUYAHOGA.—This grape is perhaps better known than some of those I have just named. It comes to us from Cleveland, Ohio; it has received, perhaps, too much praise. It is a medium-sized white grape, on a medium bunch. It is, w n fairly grown, one of the most beautiful clusters of any of our grapes. I ot call it either early, very hardy, or sweet. It is moderate in growth. atitudes where No. 2 of Rogers's, Young America of Mr. Miller's, and other r grapes, will ripen, it will ever be a favorite for its graceful bunch and del- berry. As I have seen it, it is very prolific. I have seen canes perfectly ed with its charming fruit.

NORTON'S VIRGINIA.—This is an old grape, too old to be properly placed in , were it not that, accidentally, it has been recalled from the tomb of rued grapes into which it was, for some reason, cast. It is reputed, prob- without good reason, to be a seedling of Dr. Norton, of Richmond, Vir- introduced about 1840, and hence, if it had value, should have had its merits long ago. Not until it fell by some means into the hands of the German yardists at Herman, Missouri, did its true value come to be appreciated. results of its culture there have been extensively announced by George u, esq., residing in that place. He considers it one of our best grapes value of its wine, as his statistics show. If any objection is to be made conclusions, it is in the fact that these Germans are slow to test new and some of our other valuable wine grapes they never have tried to reasonable extent, in comparison with it. His figures are such as to show e of their vines compare in quality, or productiveness and economic with this one. He says he received it by a few cuttings sent him by ller, esq., whose name I have mentioned so often in this article; that a it on a Catawba, and that he and a neighbor grew, each, one cutting roots. This was his commencement; that it proved so valuable,

that at the present time, no grape has such "immense" loads of fruit, or equa it in flavor, sweetness, and wine aroma.

The true history, doubtless, is, that Dr. F. A. Lemosy, of Richmond, Virgini about 1836, while on a duck hunt on Cedar island, of the James river, (a rock isle, four miles above Richmond,) found a wild grape, sweet and pleasant to ea His son and himself for several years picked its fruit. They told Mr. Jol Carter and Dr. Norton of it. Mr. Carter cut off the top for propagation. D Norton transplanted the root of the vine. Proving valuable, it became know Founded on facts like these, Norton's Virginia is now being eagerly sought fc largely planted, and much wine made of it.

Description.—It is a small black grape, round, on a long stemlet. long, straggling, and very graceful, sometimes shouldered. Pulp feeble, u harsh in most places for the best table grape. When well ripened in a goo soil it has a finer bunch, much sugar, and an aroma that is pleasing in its win It is hardy, rapid in its growth, full and constant in its loads of fruit, excell foliage, and its vineyard qualities give it its reputation; and extensive tracts vine-lands may be found where it will be the most valuable grape that can l grown. It is worth trial and testing everywhere, in those places in which will ripen.

OTHER NEW GRAPES.

In the hands of several gentlemen are the Diana-Hamburg, crosses of tl foreign Black Hamburg on the Diana, and with the marks of both par the offspring. At least three independent parties are reputed to have made t hybrid. It is said to be a far sweeter and larger grape than the Diana, thoug retaining its compact bunch, and much of its flavor. Like Rogers's excellent an valued hybrids, its seeds give both red and black grapes.

Several gentlemen have also made the hybrid of Concord-Hamburg in lik manner. At least two such have promise of large size and fine aroma, with th hardiness of the Concord.

Several seedlings also are arising that are yet little known, but whose valu will, without doubt, be greater than some kinds now well known.

Did time and space permit, it would be a pleasure to me to state what I be lieve is the level at which some older grapes now stand, as proven by the e rience of a few years past. For example, Rebecca. This, I believe, is d strated to be a grape that, in fair, unstimulated growth, in places where mu never prevails, by fair, honest vineyard treatment, is a fine yellowish wi grape, growing in a loose and not very perfect bunch; and on a vine so lit disposed to vigorous growth, that it needs to be set three or four feet a rt the row, and rows six feet from each other, and rarely covers a trellis over feet high. It is a sweet, delicious grape where I reside, and with such cu may be profitably made a vineyard vine. It is in this manner—and not by ex cessive praise, or culture in beds of manure trenched deep in the soil, in a st wholly impossible to be had or done everywhere—that the true value of grape is to be known. A grape or a vine that will not grow in good, mode strong soil, on which vines have never been raised, and bear remunerative l of fruit wholly without manure, is hardly worth classing among the best gra to be grown in that locality.

Speaking of excessive praise, I have no doubt that the best American g ever produced may be so commended that no intelligent mind can otherwise receive it suspiciously. When a writer ignores good grapes, and misuses a competitors, he casts grave doubts on his own favorites. We believe that v the grapes we have named may perhaps not prove the best we have, their should be fully and fairly tested; and they *may* prove to be the very b w have on our lists. What we need more than all else is, not excessive ana lusive praise of any one grape, but fair, lucid, honest statements of the

ies of every grape. He who proves and impartially states his results is ever to e commended.

So, too, we need that those who have grapes little known should plant a few ıt ınd fairly test them, both for the table and for wine. We cannot safely or trust the fruitage of one, two, or half a dozen vines, petted in their care, rown on the south side of a house or barn, and in the richest compost the owner ommand. But field culture, without shade or favor, with little or no ma- in pure air and sunlight, and with a thousand vines, will develop what is e.

In conclusion, let no one think the selection I have made for description is to neglect. I have no favorites. I would gladly describe any other really l vine. It is the fault of the owners or of the grapes that they are not wn. I hope, if life is continued, to extend this list of grapes whose dawning r proven merits are so great that they call for examination by every one inter- sted in grapes. Letters of inquiry unanswered, vines hidden under their own ushel, is my reason for not naming three or four others which I have reason to consider very well worth culture.

FRUITS AND FRUIT TREES OF THE MIDDLE STATES;

THEIR

PROPAGATION, INFLUENCE OF STOCKS, DISEASES, AND ENEMIES.

BY WILLIAM C. LODGE, CLAYMONT, DELAWARE.

The experiments of centuries have failed to establish any rules by which varieties of our standard fruits, the apple, pear, peach, cherry, and plum, may be perpetuated with certainty from the seed. Seedlings often reproduce themselves r two or re successive crops, particularly when the seed is of the wild stock, r p its chief characteristics. Or, in case the tree is completely isolated pollen of other varieties, its kind may be perpetuated from the seed; inclination to vary or "sport" from the parent is so decided, that all t with the expectation of good fruit use grafted or budded trees. It wn that seedlings from our best and most highly improved varieties e widely from the original than those from inferior grades, while the evince less vigor, and decline at an earlier age.

h and Germans have, of late years, repeated an almost exhaustive of s toward determining a system by which excellence may be with inty from fruit seeds. Their experiments, though failures as d, have proved the fact that some one or more seeds in t fruit e a stronger tendency towards perfection than other seeds cin and that, while such seeds as produce in their first crops ents continue to deteriorate with every successive plant- continue in the same ratio in the improving course. It has also trees grown from the improving seeds bear fruit at an earlier every successive crop of trees, while those grown from the deteriorating , with every crop, a longer period of growth before showing fruit. e from this fact is, that the better kinds endure a shorter to their age before fruiting. Such, however, has not been to be the case.

The experiments of the celebrated Belgian pomologist, Van Mons, with th pear, prove the different tendencies of seeds from the same specimen fruit. H however, instead of carefully selecting only the few improving seedlings fro improving parents, planted *all* the seeds of such varieties as exhibited the in proving tendency, and continued planting thus through eight successive gene tions. He found that in the eighth generation his best kinds fruited at the ag of four years, while those of an opposite tendency required a much more ex tended period to bring them into bearing.

The results of these experiments established the fact that the better kin are more likely to produce good fruit from the seeds than the wilding. Inde we have never known good fruit to spring at once from wildings with cra tendencies. Excellence is progressive, while in some cases the opposite, fro good to worthless, is accomplished in a single generation. This, however, more particularly the case in budded or grafted fruits, the seedlings seeming follow the type of the original stock rather than that worked upon it. It is tr that many of our best varieties are accidental seedlings; yet, for all we know the contrary, they may have attained their excellence by a course of gradu improvement, going on unnoticed for an indefinite time.

Change of *locality*, in case the soil or climate, or both, be different from tho in which the parent grew, produces great changes in the seedlings. Trees the same variety, planted in different localities, often produce fruit quite di similar.

Fruit will deteriorate in quality, and the trees become less enduring and m uncertain bearers, from being grown successively in the same ground. Many the finest varieties have become, in the early settled districts, so wort through this cause, that their culture has been wholly abandoned. Removed a new locality they flourish as finely as ever. In the year 1848, the father the writer sent some Rambo apple trees from his residence in Delaware, to just cleared from the woods in Indiana. He has since received specim their produce, so perfect in size, color, and flavor, as scarcely to be rec as the same variety with those grown here, from trees planted at the and procured from the same nursery.

BUDDING AND GRAFTING

are now universally resorted to when varieties of highest excellence only a required for planting. Budding is performed with most ease, greatest certaint and least injury to the stock and future tree, when it is but one year from t seed or slip, or so soon after as it becomes of sufficient size for the o ati As a general rule, budded trees attain a greater size, live longer, and grow symmetrically than grafted trees, unless the graft be inserted in the root, wh will grow about the same as a bud, other conditions being equal. The i of a bud does not check the growth of the stock, nor is the tree cut or br in the operation so as to leave a scar that may ultimately become diseased a interfere with its thrift. Budding is performed in the latter part of summer early autumn; grafting, in the early spring; therefore, should the bud fail, may resort to the graft without loss of time.

Stone fruits are generally budded, and seed fruits grafted; though cherries often grafted and do well. The peach, plum, nectarine, and apricot rarely s ceed when grafted, though they grow readily from the bud. The apple and p grow and flourish equally well from bud or graft. A graft will grow vigorously than a bud, and come earlier into bearing. Large trees are g both because the process is more expeditious, and less time will be lost in fru On trees that have been some time in bearing, a graft will sometimes f next season after insertion, often the second season, though such early be is injurious to the future growth and vigor of the tree.

STOCKS FOR FRUIT-BEARING.

When the natural stocks of the apple, cherry, peach, or pear cannot be easily procured, or where the soil is unsuitable, or when it is desirable to dwarf the tree so that it may occupy less space, or to bring the tree into bearing sooner than it would fruit upon its own roots, other stocks, or roots of a different character, are used with advantage. For the apple, paradise roots and the white thorn may be used; for the cherry, the mahaleb; for the peach, the red plum; and for the pear, either quince, thorn, or apple.

THE INFLUENCE OF STOCK

upon the fruits of budded or grafted trees is not yet fully understood by our first scientific pomologists. Many fruit-growers do not take the stock into account further than as a passive vehicle, through which the sap is drawn by the leaves, giving it no share otherwise in the elaboration of the fruit. While we admit the general rule, that fruits are produced most perfectly on their natural roots, we know there are modifying circumstances which render different stocks preferable. We have observed that, with successive plantings, some quality of the soil essential to the well being of either fruit or tree, or both, becomes exhausted; that frequently the first generation of trees endures longer, bears more abundant crops, and fruit of better quality, than succeeding generations planted in the same ground, under the same circumstances. The peach may be succeeded by the apple, and the apple by the pear, and each kind produce healthy fruit upon healthy and vigorous trees. But plant either peach, apple, or pear, for three generations successively, and the result will be a great deterioration in the quality of the fruit, a decrease in quantity, and a shortening of the life of the trees. It therefore becomes necessary to substitute, so far as practicable, other roots different from the natural one, if we wish to continue to grow good fruit upon the same ground.

On the principle that the vigorous growth of the tree is at the expense of its fruitfulness, and, on the other hand, that prolificacy interferes with a vigorous growth, we understand that to work a strong growing scion upon a weakly stock will bring the tree into fruiting at an early age. But why the stocks should hasten or retard the period of ripening, or how it changes the color, flavor, or size of the fruit, is not so easily shown. We know that a few of our best native varieties of the pear, when grown upon the quince, are more perfect than upon their own roots, and that most of the superb foreign varieties can only be successfully grown by us on quince stocks. All we know about the cause is, that the quince roots give out a more meagre supply of sap, so affecting the growth of the tree that it becomes and remains a dwarf. It is also thus brought ı bearing at an earlier age, producing larger and more certain crops of perruit, while the want of complete harmony between stock and scion has a r to shorten the existence of the tree. All our standard fruits can be grown with more or less success upon other than their own roots.

THE APPLE,

liest, most useful, and most enduring fruit succeeds better on its own ts ı any that can be substituted for them, in most localities. The white born nas been used with advantage for the codling and a few other varieties, and ful dwarfs can be formed by working the apple upon paradise stocks. ıor orchard culture we prefer the natural roots, which may be more easily c ly obtained than any others. Such, however, is not the case with the ı' ie ruit of the middle and northern States—the rich, delicious

PEAR,

whose grace of form, beauty of color, and high flavor, render it only second to the peach, while the hardiness and great endurance of the tree, and the little care it requires to perfect its annual tribute of fruit, as well as the high market value of the same, make it the most profitable. It will adapt itself to every variety of climate, and although it delights in a heavy or clay soil, it will do well in any soil where its roots do not come in contact with too much water.

The pear is, however, difficult to propagate from seed, and requires a longer period before bearing than any other fruit; hence the scarcity of young trees, and the comparative high prices they command at the nurseries. For this reason, chiefly, different stocks are so commonly used on which to grow the pear, though many other advantages result from the use of stocks of a different character from its own.

In the early settlement of the country very few pear stocks could be obtained, and various experiments were tried on the haw, apple, and thorn with partial success. The thorn proved to be the best adapted to the purpose, and several old moss-grown trees planted about the year 1710, on the farm of the writer, have borne fruit until within a short time. The thorn here used is the large variety known as the "apple thorn," which bears a berry about the size of a small red plum, and is quite palatable. The thorn gives longevity to the tree, while it detracts from the flavor of the fruit. It has generally been abandoned since the quince has been introduced in its stead.

The apple is rarely used to give roots to the pear. In a few instances, however, the effect of the apple roots upon the pear has been astonishing. Mr. Perkins, of New Jersey, in experimenting with various stocks, used the scion of a superior variety of the hedge pear, thick-skinned and late in ripening. On apple roots he found the pear grown to more than twice its largest size on its own roots, and when carefully picked and house-ripened, proved to be the finest winter pear, being a fine orange color, with tender flesh, exceedingly rich and juicy. We have seen specimens weighing over a pound, perfectly free from blemish or fault; and being so pleased with the fruit, we worked it upon some old standard trees, from which we now gather large annual crops of hedge pears! We have since worked it upon both apple and quince, and await their fruiting with interest.

Since the introduction of the quince for pear stocks, all others different from the standard roots have gone out of general use. The variety of quince proved most suitable is the Angers, a foreigner, now so perfectly naturalized that pears are grown upon it in the highest state of perfection. It is readily propagated from the slip, which may be laid in the spring, and inoculated with the pear in the autumn succeeding. It becomes a dwarf tree, and commences bearing in its third or fourth year from the slip. By a system of pruning it may be grown into almost any shape or size desirable, fitting into corners or angles, or flower plat, or any out-of-the-way spot on which the sun occasionally shines, always proving both useful and ornamental.

THE CHERRY

delights in a heavy soil and a high and dry locality. For many years after the first settlement of the country the favored home of the cherry was the "Delaware Highlands"—a tract between Wilmington and Chester, where the hills sweep down gently to the river's edge, and catch the first warm rays of the morning sun. The markets of Philadelphia and New York were, for more than half a century, supplied with cherries from this locality; and well-grown trees of improved varieties have been known to represent a capital of from one to two hundred dollars each, in the transfer of real estate, the produce of the trees

verging thirty to forty dollars each, annually. John Brown established his ursery and fruit farm here about the year 1780, and the noblest cherry, pear, nd apple trees now standing in the neighborhood are of his planting. Genera- of trees have since been planted and have passed away, while these vete- still flourish in their pride and beauty, and yield annually large crops of ior fruit. While the old trees preserve a uniformly healthy habit, young f the same variety, even when budded from these, become diseased—the rk of the branches cracking and leaving great black ruptures, which affect rowth and finally destroy the tree. This we now remedy by working the ry on the mahaleb stock, which brings it earlier into bearing, and, like the e, has a tendency to dwarf the tree. By judicious pruning, the mahaleb be equally adapted to dwarfs or standards. When pruned from the ots upwards, good-sized trees may be formed, almost rivalling the cherry on own roots; while pressed from the top downward, it may be shaped into a arf of any requisite size or form. The cherry is now on the decline with us.

THE PEACH

ecome the most important as well as the most profitable fruit of Dela- For many years we enjoyed the monopoly of the best markets in the ue or eastern States. The Messrs. Reybold planted thousands of acres, their fruit was justly considered superior, and accordingly commanded erywhere the highest prices. They freighted steam and sailing vessels for ery important market within reach, embracing even those of Canada, on the . Lawrence. The size attained by the trees, and their enormous crops, aston- l all who visited them. It was supposed by many that the cultivators sed some secret which enabled them to grow both better trees and supe- r fruit. Their secret was suitable soil and climate, and thorough cultivation. ilures were unknown in the orchards first planted, and it was not until the ond orchards were in bearing that any deterioration was noticed in the quality fruit, or failure in the health and vigor of the trees. The second planting iced uncertain crops of inferior fruit, and the trees endured only half the l of those of the first planting. After the second crop of trees the decline so rapid that peaches were rarely grown in the locality, except on plum s.

ne orchards of Messrs. Reybold were located near the centre of New Castle . Peaches were previously grown quite extensively in the northern part State, and the adjacent districts of Pennsylvania; but they had run out, he Reybold orchards were in their prime. At the present time the finest s taken to the New York and Philadelphia markets are grown in the of Dover, (which occupies a central portion in the State,) and in the e northern section of the State, where for many years their cultivation holly abandoned.

at is known as the "peach district" is not confined to any one locality iborhood for more than a single generation of trees. It is progressive, from the north toward the south at the rate of about fifty miles in twenty s, when it again returns by a single leap to the place of starting. In other rds, peaches are grown with complete success only after the ground has for a period of about twenty years; it having been found that intervals h length are necessary, in order that the soil may become perfectly dis- from all injurious qualities imparted to it by diseased trees, or that it y recover those peculiar constituents exhausted by the growth of previous

peach, when it fails upon its own roots, may be grown to a limited extent roots of the plum. We have heard of large crops being gathered from rchards; but our own experiments with the plum stocks have not proved

satisfactory. They may answer in a more northern locality, where the flourishes and the peach fails; but in our congenial climate and suitable soil the peach, we have not found such substitution of general advantage. peach will outgrow the plum stock, and, when in full foliage, the high wi are apt to break it off at the place of junction. This may be avoided by b ding below the surface of the ground; but in that case the borer will select tender bark of the peach, where it unites with the plum, and at once girdle tree. The plum stock gives the peach a deeper color, while it detracts soi what from the flavor and renders the flesh more coarse. This may be accoun for from the fact that the sap of the plum starts later in the spring, and cea to flow earlier in the autumn, than that of the peach, thus shortening its natı season and giving the fruit less time for the perfect elaboration of its juices.

THE APRICOT AND THE NECTARINE

are budded both on peach and plum stocks; but owing to the destructive atta of the curculio, we seldom obtain a perfect crop of either fruit, unless wl grown under glass. We have noticed that, like peaches, the plum stock gi the fruit a deeper color than when grown on peach roots, though the flavoı not perceptibly changed by its influence. The apricot is liable to injury fı late frosts, as it blooms so early in the season. We have found it a good p to set the trees on the north side of a wall or building, so that they may shielded from the rays of the sun while the frost is upon them.

THE GRAPE

may be grafted either in the root or the extremities, though success is uncerti owing to the thin bark and porous quality of the wood. Large vines are soı times grafted by cutting them off at the ground and boring holes in the stuı in which are fitted the scions with the bark on them. The soil is then dra up and pressed about them, leaving only the top bud uncovered. The ot buds, if any, can strike root and assist in the growth of the vine. Seedlii make the best stocks for grafting, as they are furnished with better roots tl slips or layers.

It may be here remarked that grafting is most successfully acc when the stock and scion nearly approach each other in general charac the Catawba and Diana, the Isabella and Concord; while there is little sy pathy between the more highly improved varieties and the common chicken frost grape, and none whatever between the best kinds and the ordinary sour grape.

THE INSECTS

injurious to fruit and fruit trees are not numerous in variety, but so destru as to render fruit growing a precarious business in many parts of the c and even to cause the cultivation of many kinds to be wholly abandoned.

The *caterpillar* is hatched in the early spring from a collar of eggs deposi around a branch the preceding summer by the mother butterfly. It begin feed upon the tender leaves of the apple and some other trees as soon as tl appear, and increases in size and capacity for destruction with the growth of foliage, destroying it as fast as it grows. When numerous, it has been knowı strip whole orchards of their leaves, thus destroying the fruit crop for the s and sometimes proving fatal to the trees.

The *remedy*, however, is efficient and easily applied. In the early morni while the dew is on the foliage, sprinkle fine air-slaked lime freely over the t The caterpillar will drop almost as soon as touched by the subtile dust, or] while holding to the leaf. The same remedy is equally efficient in regard to *thrip* of the grape leaf, and the *slug* that depastures upon the foliage of the c

ile the caterpillar is depredating on the leaves of the tree, the *borer*, a subtle and dangerous enemy, is often at work at the roots.

borer is the larva of a brown beetle, striped with white, which, like a seldom shows itself in the day-time, but flies about at night in the early er, and covertly attacks the tree near the surface of the ground, where it a small hole in the bark, deposits its eggs, and trusts to nature to hatch into life. The young worm feeds at first upon the tender bark, until, ng larger and stronger, it strikes into the "pith of the matter," eating away od of the apple tree, so that it may fall before the first puff of wind, or die ng on its mutilated roots. This pest is also particularly fond of the quince, can only be saved from it by closely watching. When the pear is worked uince stocks, it is necessary to set the roots below the surface of the d for the security of the tree; otherwise, it will be sure to girdle the stock the two woods meet.

remedy—the only *sure* remedy we know—is the knife, and a pointed it to impale it in its holes. An application of ashes has been recomn as a cure; but we have tried it, and found that it destroyed both borer ee. Coal ashes or lime, applied judiciously, may be a preventive; but so the earth drawn up around the trunk and pressed hard, so that the butcannot penetrate it. Better than either is a small piece of oil-cloth tied to the trunk of the tree, and drawn down to the ground where the lower are covered with earth, to prevent the insect reaching the bark.

bark-louse is a less formidable enemy than either caterpillar or borer. ches to the young and smooth barks of the apple and pear, sucking their and retarding their growth, until, finally, it destroys the tree altogether removed. A single washing with strong soap-suds will generally clear e of them, and restore its vigor, if attended to in time.

apple-worm and the *curculio*, or plum-wevil, affect the fruit only. The nters at the blossom, and feeds at the core of the apple, causing it to fall turely from the tree. The curculio is a small brown insect that stings the and tender fruit, depositing its egg in the flesh of the plum, nectarine, or t, where it soon hatches and commences, in the larva state, to feed upon it. It is so destructive that a tree loaded with young fruit will sometimes ve a single specimen left to arrive at maturity.

dies and preventives, in great numbers, have been tried with only parccess. Bottles, half-filled with sweetened water, are sometimes hung in e, and captivate a few. Spreading a cloth on the ground under the tree, n jarring the tree while the insect is partly torpid with the cold, in the morning, will cause many to fall, when they may be easily destroyed. smelling herbs, such as tansy and elder-leaves and blossoms, or other us matters not agreeable to the olfactory nerves of the insect, are hung the branches, in hopes the insect will give them a wide berth. But the eventive is to dust the trees with sulphur or lime when wet with dew. nethod will sometimes keep the insect from the fruit if applied in proper , taking care to renew the application whenever the rain washes the dust he leaves and fruit.

DISEASES.

h fruit and fruit trees are subject to so many diseases that, frequently on count, and in consequence of destructive insects, a good and full crop is red during the whole life of the tree. We will mention a few of the aal, and give such remedies and preventives as have been found beneficial.

apple is such a hardy fruit, and the habit of the tree so uniformly healthy, e know of but few diseases to which it is subject, and those are not of a haracter. The most serious is that known by the general name of *blight*, affects the terminal branches and destroys the crop for the year. The

cause is attributed by some to the sting of an insect—by others to frost; but being involved in uncertainty, the remedy is likewise uncertain.

The pear is also subject to the *blight*, which assumes a more dangerous form than in the apple. The disease begins with the early summer, and first appears in the extremities of the branches, from which it extends rapidly toward the trunk, causing often the speedy death of the tree. Sometimes its strength is expended before the destruction of the tree is completed, and it may partly recover. It is indicated by a shrivelling of the bark upon the branches, and withering of the leaves which still adhere to the affected branches. Such trees as continue a vigorous growth late in the autumn are most subject to the disease, and, consequently, fertile soils and thorough tillage have a tendency to encourage the malady. The disease is contagious, and young trees in the immediate vicinity are liable to be affected if not attended to in time.

Remedies have been tried, though not always with complete success—such as washing the parts affected with ley; also, Downing recommends a solution of copperas and diluted muriatic acid. But the *sure* remedy is to cut off the branches at once below the part affected, and burn them. This will be a certain cure, provided the cut is made at a sufficient distance below all external signs of the disease. Sometimes the sap is vitiated below the part in which the effect is apparent, and the disease breaks out again.

Black knot.—Except in a few favored localities, the plum is, of all stone fruit trees, the most liable to disease. Its peculiar malady is the black knot, which is an eruption of the branches, causing an excrescence like great, unsightly warts, and so interferes with the flow of the sap as to cause the death of the branches beyond the place affected. The black knot, like the pear blight, is attributed to various causes, the most probable of which is a disease of the sap imparted from either the soil or atmosphere; as healthy trees, removed to a neighborhood where the disease is unknown, are not affected. The disease seems to pervade every part of the tree, and shows itself as virulent in the young trees which spring from the stump of the affected tree as it was in the parent. Of all the remedies yet recommended, we have not found any one effectual, though we believe a proper application of a solution of salt would preserve the health of the tree, and prevent the destructive attacks of the curculio on the fruit. The difficulty is in the application without injury to the tree.

The cherry is also subject to a disease which shows in the rupture of the bark, though the wartlike excrescences are not formed as on the plum. Like the sap blight of the pear and the black knot of the plum, the certain cause and remedy have not yet been determined. Some varieties, as the Black Morello and the English Morello, are subject to the black knot similar to that on the plum, and, as in regard to the plum, we candidly admit both cause and remedy are to us unknown.

The yellows.—In the middle States, where the peach arrives at the highest perfection, it is subject to but a single disease, and that, when fully developed, is of a fatal character. It is known as the *yellows*, and when young trees are grown from the seeds of diseased fruit, it sometimes shows itself in seedlings one year old. In most cases it is not noticeable until the tree has borne one or two crops of fruit, when it is indicated by slender, erect branches starting up from the larger limbs, a general sickly appearance of the tree, and a dull color of the foliage. The fruit also becomes discolored, and so changes from the natural taste and appearance of the variety as not to be recognizable as the same. When first attacked, a single branch only is sometimes affected; but by the following season it spreads over the whole tree, which struggles feebly for life for a season or two, producing small, immature, and flavorless fruit. The yellows is a contagious disease, and is imparted to other trees by contact or propinquity, as well as by a knife used in pruning trees affected, from buds taken from infected trees, and from the soil in which such trees have grown.

Remedy.—As a remedy, we have known iron filings and scales from around lacksmith's anvil, placed about the roots, at the rate of a good shovelful or re to the tree, to have a good effect. An application of hot wood-ashes about roots, so that the ashes come in direct contact with them, will prolong the of the tree; but the best preventive and cure is an application of Peruvian o, sowed around the ground and harrowed in. We have seen old orchards, rently worn out, revived by this application, which have borne fruit for ıy years after. One of my neighbors has adopted the plan of throwing fell -slaked) lime over his trees about the time the curculio deposits its eggs, and owing guano in his orchard every spring, with most satisfactory results. rops are unfailing, and the life of his trees extended to more than double age of others in his immediate neighborhood.

Ve believe we have discovered a sovereign remedy for nearly all diseases of fruit trees, as well as for the destructive insects, which so frequently destroy I after it has given promise of satisfactory crops. It is nothing more than n salt. We have experimented with it on bushes and young trees, with able effect in many instances, though sometimes with injury, owing rather manner of application than the agent employed. Its application was first ted to us as an insect destroyer, from the success of an experiment made ne tree-moth. We found it altogether effectual in preventing injury from troublesome pest, and so we extended our experiments, with almost equal suc- , to the fruit-destroying family of pests. The difficulty is in the proper ition of the remedy or preventive, as salt is so injurious to tender vegeta- ınat, frequently, we cannot reach the insect without also touching a bud, n, or tender leaf. Where the atmosphere is impregnated with saline particles, ıy all our troublesome insects and most of our diseases of fruit trees are wn. The most perfect fruit of the peach, plum, nectarine, and apricot, ıne st enduring trees, are found in the neighborhood of salt water. On the ıands, along the Delaware and Chesapeake bays, all stone fruit trees bear ul crops, and endure much longer than in the interior. On the islands of s where the shores are washed by salt water, we have found peach and rees with their loads of fruit in such perfect condition as we have never elsewhere. Of the many plum trees we have examined in those localities ıave yet seen no trace of black knot, nor any sign of the curculio on the fruit. h trees flourish and bear annual crops at the age of fifty, and in some cases y years, and on the islands of the Chesapeake the figs produce two or e cessive crops of perfect fruit in the same season.

THE NATIVE FRUITS OF THE FAR WEST.

BY R. O. THOMPSON, NURSERY HILL, NEBRASKA.

hile producing many varieties of fruits by hybridization of those already ultivation, and the importation of others that seem suited to our soil and ıte from abroad, the wild fruits of the far west should receive the attention e who feel an interest in the horticulture of our country. There are y eties which, when cultivated, will occupy a prominent place in the r of North America.

wild plum, *Prunus americana*, *P. umbellata*, *P. chicasa*, and some -five other varieties, are found upon the banks of the several Nemahas in Territory. In early spring the eye can wander over hundreds of acres of plums, one sheen of white flowers covering the entire landscape; and

the air is laden with their sweet fragrance. They are found with leave nate, doubly serrate, smooth, long, round; smooth above, downy beneath. ' of straight, trim growth, ten to twenty feet high; others three to four feet, shrubs, but each year bearing their loads of delicious fruit. Fruit of all and all forms that the prune family assumes—deep red, purple, pink, yellow, orange, salmon, blue, green, and others almost white; the green white varieties are almost invariably shaped like Coe's Golden Drop; and of them are much larger in size. The yellow have more the form of Colu and Washington; the other colors are formed like Purple Gage. All the vari except the red and one or two others, part readily from the stone. Where are such immense groves of these plum trees, and millions of the young set each spring, it must not be supposed that the eternal enemy of the the curculio, is not to be found; here it is that their numbers may be called le

Something over four years ago my attention was directed to a thrifty of these trees, by finding the branches literally loaded with very large while all others were pretty effectually thinned out by the "little Turk." fruit of these same trees has each year, since that time, withstood the at of this insect, and the bearing has been equal to many of the culti varieties. The skin is tough, not very thick, and may be pared like an a The flesh is firm unless very ripe, then melting and juicy. The tree, fol and fruit, all show a wide difference from the other native plums of Nebr Iowa, or Illinois. Pruning and cultivation improve size and flavor. S have been sent to several experienced nurserymen in the eastern States to their qualities. When grafted upon their own stocks they require very working, as the bark is quite thin.

As a stock, to bud or graft the plum, apricot, or peach upon, there is no be as is evidenced by the fact that eastern cultivators, who have tested them, sent here for their stock for the past two years. Their extreme hardihood, their free union with the cultivated plums, will make them valuable to the grower. When grafted upon the root of this plum in winter, by setting there is a perfectly smooth callous formed at the junction, as in apple-root g ing. A tree on my grounds, three years from the seed, bore eight hun perfect blossoms; the same tree was pruned to an even round head, 3½ feet from the ground.

A variety with greenish white fruit has never ripened but one year in the fruit being green and hard when the severest cold of October came When picked in the fall, after the hardest frost, before the ground fre and put away like pears, they ripen readily. One tree that bears a round plum, a little larger than a cherry, has invariably borne double fruit.

There are three varieties of the gooseberry indigenous to Nebraska. One *Ribes cynosbati*, a variety with prickly fruit, is of no value whatever as a for man; when ripe, even birds seldom disturb it. Two other varieties found. One bears a berry long, large, and of a deep green color, quality first-rate. The other has been named the Nebraska prolific gooseberry. stands two to four feet high; canes thickly set with long thin or slim tho a purple color; leaf very much resembling the Lancashire varieties; fruit than the Houghton, veined, and of a clear transparent green; nearly r flattened very little at the ends, and possessing a rich, vinous flavor. S specimens have been found nearly an inch in diameter. In the past four I have examined thousands of bushes, and never found mildew upon a them.

A form of the *Rubus occidentalis*, called here the Western Black r b grows along our streams and in woodlands; fruit one-third larger than the can Black Cap, where it is cultivated, the canes making a much stronger gr Specimens sent to Pennsylvania three years ago have borne fruit, and fully tain its superiority. *Rubus strigosus*, found in but one locality in nort

, and called the Elisdale raspberry, is a valuable acquisition; fruit very ', bright red, with light bloom, very sweet and rich; canes grow ten to ty feet in a season; is quite hardy. This was first introduced to my notice I. A. Terry, of Crescent City, Iowa.

ibesia.—There are three varieties of the currant found wild in Nebraska, of them being of any size or flavor; but I have four varieties, found in ı, which will compare in quality with any of the kinds in cultivation. The k and red kinds from there have borne fruit with me one inch in diameter. white or yellow and the blue are not so large or of as good quality as the er. A lot of seedlings are showing some peculiar forms of hybridization. eived cuttings of the Utah currants from some half dozen sources; only lot was of any value, and they were improved seedlings selected from about housand plants. All of these mountain currants possess the peculiarity of adapted to very dry soils, and make heavy crops where our cultivated would scarcely fruit at all.

RAPES.—*Vitis labrusca, V. æstivalis, V. cordifolia*, and many curious forms ybridization, are found here in plenty. One or two varieties have been taken their wild state and cultivated. They possess good wine qualities. The , at two years of age, is much the flavor and color of Oporto. All of these es are perfectly hardy. There are no varieties here that possess enough qualities to be called "table grapes." Some seasons many hundred gallons e above-named wine are made from the native grape growing wild along water-courses. Such wine sells readily at from $2 50 to $3 per gallon. ne leaf and flower of the various forms of our native grapes are a study for otanist. A few years ago I received a letter from a gentleman of New , much interested in fruit-growing, concerning a "tree grape," of which he been informed by parties who had seen them on the arid plains or in the s. It would not be out of place to state here that this grape was said to f enormous size, and to grow upon a small shrub. I have found, by care-earch, that no such grape exists there, and that what was probably taken uch, and is equally strange, is a cherry of the size of a well-grown May e, very sweet, melting, of rich delicious flavor, nearly oblong, and of a change-brown purple. This fruit is set in heavy clusters, on long stems, beneath leaves, and upon a tree never more than one to two feet high! At two s from seed it produces a most bounteous crop of these rich and luscious ies. It is so hardy here, in N. latitude 40° 39′ 43″, that the tips of the ches were not even killed last winter in our coldest weather. It layers as ly as the grape; will grow from cuttings and single eyes. It ripens in ember. The fruit, foliage, and growing shoots, all have a waxy or varnished arance. I have a number of these miniature cherry trees that bore fruit ast season. Had they no other qualities to recommend them than as orna-al shrubs, there would be few finer ones; but add to this a most rich and ous cherry, and we have a shrub of rare excellence and beauty. Plants of lwarf mountain cherry will be sent the Department of Agriculture, to test ality and adaptability to that soil and climate.

AMERICAN FORESTS;

THEIR DESTRUCTION AND PRESERVATIO

BY REV. FREDERICK STARR, JR., ST. LOUIS, MISSOURI.

THERE are few subjects so closely connected with the wants of societ general health of the people, the salubrity of our climate, the production o soils, and the increase of our national wealth, as our forests; and yet no co erable interest of our country has received so little attention at the hands c people, and enjoyed so little of fostering protection from the government.

It is my intention in this article, by a simple array of important facts a few passing suggestions, to call the attention especially of our landhol farmers, and mechanics to an impending national danger, beyond the pow figures to estimate, and beyond the province of words to express. If I ca fluence these classes but a little; if but a few facts shall be added to the pr knowledge possessed by each; and if, therefore, but a slight effort be put by every one of them, the aggregate of interest, intelligence, and action thu tained will be immense. There were in the United States in 1860, 2,044 farms under cultivation. Could each farmer, having timber on his own lan led by the facts presented to so husband his trees, or improve their qualit replace judiciously and speedily those removed, as to equal one-half acr common forest each year, and if those whose lands are destitute of timber c be led to plant the equivalent of one-half acre per annum, we should either or produce, annually, 1,022,038 acres, which would be something towards setting the destruction, and warding off the coming desolation.

It is feared it will be long, perhaps a full century, before the results at w we ought to aim as a nation, will be realized by our whole country, to wit: we shall raise an adequate supply of wood and timber for all our wa The evils which are anticipated will probably increase upon us for thirty y to come, with tenfold the rapidity with which restoring or ameliorating shall be adopted. Every hour, therefore, is precious. We have, as a natio too long disregarded this interest. Growth is slow and restoration tedi while destruction is rapid and injury instantaneous. Delay, therefore, is cruel and disastrous to ourselves. Attention is, therefore, respectfully invite the following statements:

EVILS OF PAST DESTRUCTION.

1. *A great increase in the cost of fuel.*—In all our cities and large towns consumption of fuel exceeds the production of the neighboring country. brought from a distance, and its transportation makes its value enormous onerous.

The railroads consume great quantities of wood, and exhaust the supply a their lines. Steam-engines, for manufacturing purposes, are not erected in dreds of places, simply because of the high price of fuel. The expe of e class in the community are thus increased, but it especially opp in ious poor. It diminishes their comforts, gives them im cooki

usly exposes their health, holds them back from a competence, and, in mere ence of life, consumes a large fraction of their earnings which else could have n used for education, purchasing personal effects, or securing for their families iome.

When the proprietors of mines will sell coal only to certain favored dealers in ies and towns, and when great railroad companies refuse to carry coal for any rsons except these same dealers, their monopoly reigns supreme, and then ly the presence of wood in considerable quantities can save the people from tortion, or from absolute suffering.

In any region, hamlet, or city where fuel is dear, the scarcity proves itself a etriment to happiness and an injury to business.

2. *A great increase in the price of lumber and timber.*—This hinders the rection of dwellings. A poor man now labors years longer to obtain the means o build a house than he did ten years ago to erect one equally convenient, valuable, and spacious. Years of his life and toil are thrown away simply to meet he enhanced price of lumber. The growth of our cities is retarded by it; small and often uncomfortable tenements are built where larger, more substantial and costly ones would have been erected. Landlords not only charge high rents, but make the expensiveness of building an excuse for unjustifiable exactions. Tens of thousands are thus discouraged from becoming freeholders. The costliness of lumber also makes furniture very expensive, so that our countrymen must purchase poorer and less elegant articles than the same money would otherwise provide, or consume means they need for other permanent uses.

3. *High rates of fares and freight charges on our lines of travel and transportation result from the increased cost of building and equipping steamboats and railroads.*—Ships now cost, as regards their main material, fully double the expense a few years since. The increased price of lumber used in the superstructure of a railroad for its depots and for freight and passenger cars has added much to the capital upon which they must make dividends, or the bonds upon which they pay interest. The enhanced value of fuel also increases the expenses of running the road, while, worse than any of these, the force and time required to move coal for the consumption of the people along the line of the road, and to convey fuel for the use of the road itself, diminishes the capacity of the road for other business, consumes machinery and labor, and interferes with more legitimate commerce. In the winter of 1864 and 1865, on the line of some of the New York railroads, the people in the villages and cities were without fire in their houses awaiting the transportation of coal, while the perishable products of farms by hundreds of car loads were lying in the depots for weeks and months awaiting transportation, and shut out from market at the most eventful . On all the great carrying lines of our country, whether by steam-car or steamboat, this question of fuel has become one most important and vexatious as regards quantity, ease of obtainment, and price.

Among the things which are most fundamental to a nation's material growth and prosperity, we name these four—cheap bread, cheap houses, cheap fuel and cheap transportation for passengers and freights. A nation which produces the raw material for every species of manufactures and commerce, and that at low cost—whose people provide their own houses, and raise all they consume—which can move its people, its products and manufactures, quickly and cheaply, is in condition to establish the most complete division of labor, and to give to every man the results of his abilities, energy, and skill. Such a nation must prosper. Its people will save and accumulate immense sums from their respective earnings; this question of wood enters largely and constantly into each one of these our great departments of industry and living.

INCREASE OF DESTRUCTION.

The older portions of our country are, even now, drawing their supplies of lumber from the newer States. For black walnut, and some other woods used in cabinet manufactures and in carriage-building, the eastern States are already sending to Michigan and Wisconsin, while tens of millions of dollars' worth of pine are brought about two thousand miles from our upper lakes and the head-waters of the Mississippi to our Atlantic and Gulf seaboard. Foreign nations, also, are consumers of our forests. Oak and pine are exported by us to other countries for purposes of house and ship carpentry. A single gun factory in Europe, during the first two years of the rebellion, consumed 28,000 walnut trees to supply gun-stocks for the American market. This fact will give some indistinct idea of the consumption of lumber in great factories of cabinet ware, where the amount of wood required for the smallest articles exceeds that required for the stocking of a musket.

In the State of New York alone, within the ten years from 1850 to 1860, there were brought under cultivation 1,967,433 acres of land hitherto unimproved. As there are scarcely any lands in the State of New York naturally untimbered, it is probable that during those two years more than 1,500,000 acres of what had been (or was then) timbered land, was cleared for purposes of lumber and agriculture. Thus, 500 acres of land were changed from wood-bearing and timber-growing, each day, for 300 days each year, through that period of ten years, into farming lands.

During the same ten years more than 50,000,000 of acres in our whole country were brought under cultivation. But these improvements were especially made in Iowa, Kansas, Minnesota, Wisconsin, Illinois, Indiana, Ohio, and Texas. These States, to a greater or less extent, are dotted with prairies, or suffer from a scarcity of timber; many prairie farms were, therefore, taken up. But bear in mind, that every man seeking a prairie farm desires, in his selection, to secure small streams and as much timber as possible upon his farm, or near to it; so that, while the reckless waste which attends new clearings in forest districts has not existed in the case of these prairie farms, their owners have wonderfully diminished the very scanty supply, even while they have dealt with it with an economy almost penurious. We will allow, then, for unwooded country brought into cultivation two-fifths of the whole, (which is probably more than twice as much as was the fact;) this will leave three-fifths of the 50,000,000 of acres brought into cultivation, or thirty millions of acres, which were lands either previously or during those years heavily timbered. Assuming, as before, 300 working days in each year, 3,000,000 of acres were thus, each year, lost to tree-growing, or 10,000 acres each day.

In all regions remote from a market, and where logs and lumber cannot be readily exported, no matter how grand the forests, how excellent the timber, the trees are killed by girdling, and left to stand until overthrown by their own weight or by storms, and are then consumed by fire, yielding in return for their displacement only ashes to act chemically upon the soil, the fire often injuring the earth itself far more than the value of the ashes returned.

The land thus stripped of forests is permanently alienated from timber-growing. In many places in the eastern States, where the mountains are too precipitous and rocky to allow of cultivation, a second growth of timber is permitted and even cherished for firewood and the making of charcoal; but arable lands, once cleared, are scarcely ever permitted to be overrun a second time with forests. In fact, destructive man so utterly robs and impoverishes his lands of timber that he destroys the beauty of the landscape, and beyond the fence of his "wood-lot" leaves no shade for man or beast.

Increasing population swells these evils. Between 1850 and 1860 our population increased 8,080,785. It is now advancing at the probable rate of over

million souls per annum. The consumption and exportation of lumber in United States, in 1860, was $37,390,310 more than in 1850. The ratio in increase in population was but 35.59 per cent., while the increase in lumber 63.09 per cent. This shows that the demand for wood for agricultural, chanical and domestic purposes (notwithstanding all the use of iron in manuturing useful implements, and the use of iron, stone and brick for bridge and use building) increases each year with the advance of the nation in age and alth.

If for twenty years to come the demand for lumber shall advance in the same io to the population as in the past twenty, more than two hundred millions dollars' worth of *American sawed lumber* will be needed each year, and the ne ratio in increase of population, which has called the fifty millions of acres o use in ten years, will then be calling it in the rate of more 100,000,000 of res each ten years. Our native-born and foreign population will have farms, s and houses, fences, furniture, vehicles and agricultural implements; but ery year they will impoverish the United States more and more of her lumber, d all these things will demand a higher price.

The great State of New York still holds pre-eminence as furnishing more nber than any other State; but as long ago as 1850 it reached the maximum its ability to furnish lumber. With the enhanced price of 1860, as compared th 1850, that State produced about one million of dollars less of lumber in 60 than in 1850; while the State during those ten years increased her popuion 783,341, she diminished her supply of lumber almost one million of dollars ch year. Five other States in this Union also diminished their supplies of er during those ten years. Some of the newer States are developing their nber interests; but our whole country (aided by foreign nations) is using up products of their forests very rapidly.

Speaking of New York, the completion of the new railroad from Saratoga rings northwestward, called the Adirondac railroad, and traversing the vast oded region known as the "John Brown Tract," will, a few years hence, bring great amount of lumber into market, which has hitherto been inaccessible. t it is doubtful whether even this will equal the amount of destruction which ll, in the mean time, take place in other sections of the State. The black lnut has almost wholly disappeared from the State. The wild cherry and cumber tree are great strangers, the hard maple and hickory in some sections nearly gone, while entire counties, formerly heavy with hemlock and pine, n with difficulty supply now and then a farmer with a knotty sill for a small rn; and the opening of the mountainous Adirondac region, it is feared by , will so let down the cold and storms of the northeast upon central and stern New York, that, in the effect of the bleakness upon human health and destruction of grain crops by intense cold, every foot of lumber secured erefrom for commerce and industry will cost double its value in the injury to ner interests.

CONSUMPTION BY BUILDING RAILROADS.

The average cost of sleepers for one mile of railroad is one-eighth the cost of e iron, with these points of difference: the iron, if of the best quality, will st from twenty to twenty-five years, while the sleepers will last but from five seven years, unless chemically prepared at a great increase of cost. Decayed epers are worthless, and are thrown away or given to the hands on the road r firewood. But, on the other hand, bruised, broken or split rails can be wrought, and come a second time from the rolling-mill with little waste, and en of better quality than when first made. The mere cost of rough timber r sleepers will probably, in time, prove to many of our railroads an expense eater than the first cost of the rails, even including the keeping of the iron ils in repair.

Between 1850 and 1860 there was built in the United States 22,204 miles of new railroads. New timber was required for all these. But for nearly 8,589 miles of previously existing roads there was needed, during this period, for the replacement of old timbers, more than the amount necessary for their first construction. So that there was used in that time 65,897,020 pieces of timber, costing, at the low average of thirty-five cents a piece, $23,063,957.* But, besides all this, there were building and not yet brought into use, on January 1, 1862, about 17,827 miles of new road, for all of which new sleepers were needed. When it is remembered that these sleepers are generally sound hemlock, chestnut, and especially oak; that trees are selected to make them of a size just sufficient to furnish one or two sleepers only, (the tree being simply hewn on two sides, and having the heart entire,) the destruction of choice timber just approaching a size suitable for sawing is immense.

The lumber used in fencing their lines of railroads, (more than 60,000 miles,) and in erecting bridges, depots, station-houses and cars, is also a great item, to which we have but limited means of approximating; and leaving it we will notice—

CONSUMPTION FOR RAILROAD FUEL.

It is estimated that one and three-quarters cords of wood are equivalent to one ton of coal, and on an ordinary train will drive the engine twenty-five miles. Let us call the New York Central railroad three hundred miles long, (the length of its direct trunk,) and let us assume that an equivalent of only ten trains, passengers and freight, pass over it every twenty-four hours. This will give us a total of twenty trains each day. Let us now account for only three hundred days in each year, which will allow for floods, accidents, snows and Sabbaths, and we have the distance travelled by the trains 1,800,000 miles. For each twenty-five miles there is consumed, at the ordinary estimation, one and three-quarters cords of wood, making 126,000 cords per annum, which is supposed t[o] be by one-third less than the amount actually burned by them. In the fall an[d] early winter of 1864 and 1865 the runs on this great road became very irregu-lar, as the supply of fuel fell short, owing to the high prices demanded by th[e] farmers. The engines of this road were made for burning wood; unable t[o] obtain it, or compelled to burn it green, the company were forced to burn coa[l] in their engines, and for many weeks the trains were irregular, freight accumu-lated, and many splendid engines were badly injured. Energetic agents wer[e] sent back into the country, and by offering high prices, and making great ex-ertions to supply the road, in mid-winter the trains began to resume their regu-larity. When the devastations of the forests have continued another generation the New York Central railroad, now just about twenty-five years old, will b[e] obliged to buy its fuel and have it brought to it, or else own its own mines, an[d] build a branch road to them, and distribute coal for its own use through it[s] entire length. Already the "Onondaga Salt Company," with the Erie cana[l] and all its branches to bring its fuel, cannot depend upon the wood of the State but has purchased its own mines in Pennsylvania, and carries all the fuel for it[s] immense works more than one hundred and fifty miles.

If we should average all the roads of the United States, and assume that onl[y] ... trains each day pass over each road, (including passenger, freight, extra repair, wood and paymaster's trains,) we should have in the whole Unite[d] States 307,930 miles travelled daily, demanding a daily consumption of 21,55[...] cords, or, in 300 days, 6,465,500 cords.

... ny great steamships, steamboats, founderies, rolling-mills, and factories ... description, also many families, use coal entirely for their fuel, and th[e] interest is becoming one of the most important in our land.

The census of 1860 gives full statistics of coal, while in the compendium f[or] 1860 wood is mentioned only in a table of sawed lumber. In the compendiu[m]

0 the only mention of wood is as follows: "Cord-wood on the bases of 320,000,000." It is thought, with the increase of navigation, manufactures ›pulation between 1850 and 1860, that the cord-wood actually sold by ers to actual consumers and railroads could not have amounted in 1860 than $50,000,000, while the total of all the coal mined in the United in 1860 was but $19,365,765.

GENERAL CONSUMPTION OF WOOD FOR FUEL.

are to remember that, in the occupations of men, the farmers furnish their iel. The farmers number in this country 2,423,895; while the next most ›us class is but one-tenth as many, to wit, *carpenters*, men who live by ıg upon forests—these number 242,958. The blacksmiths number 112,357, 184 485, merchants 123,378, miners 147,750, shoemakers 164,608, 101,866, teachers 110,469. When we come to count what are denomi- laborers, there are but 969,301 "common laborers," while, besides the 395 farmers proper, there are 795,679, farm laborers. Remembering that s produce their own fuel, and often use it with great freedom, it is le that the total consumption of wood for fuel in the United States will the lowest estimate upwards of seventy-five millions of dollars per annum.

CONSUMPTION BY MECHANICAL INDUSTRY.

re are sixty-six occupations enumerated in the census which depend, in or in part, upon lumber or wood as their raw material for manufacture mmerce, employing a total of artisans of 476,623 souls, representing in ımilies, probably, more than 2,000,000 persons. We will enumerate a f them: Carpenters, 242,959; coffin-makers, 7,000; cabinet-makers, ; chair-makers, 6,341; sawyers, 15,000; millwrights, 9,063; ship- ters, 13,379; coopers, 43,624; wheelwrights, 32,693; piano-makers, coach-makers, 19,180; and thus proceeding until sixty-six classes are ;ally named. But there are others whose callings are very intimately ted with the use of wood and depending upon it, not at first sight occur- the mind as their occupations are named. There are charcoal burners, ime burners, 1,456; brick-makers, 13,736. How intimately are these connected with the entire destruction, the use, and the manufacture of All the occupations to which we have alluded are such that as our tion increases, and the national wealth becomes greater, more persons will nanded to labor in each, and the necessity for wood will become hourly ›ressing. But we must not tarry.

DESTRUCTION BY WAR.

destruction of forests and timber during the war of the rebellion has been se. Both armies, the Union and the rebel, have destroyed it. Much has uined by accidents; it has been removed for military purposes, both by e and fire; it has been taken to supply fuel for the armies, to erect ations, to hinder the movements of the enemy, and to open the country litary movements. Timber, whose value had been enhanced by labor ed upon it, was also destroyed—as the sleepers from torn-up railroads, nd costly bridges, and dwellings and outhouses consumed by fire. Then aying of railroads, and rebuilding of bridges and dwellings, wherever this en done, demands a new supply. We are told that native Virginians, in ections of that State, are removing, because the war has swept away the ; and, for the same reason, emigrants decline to go into some of the finest the State as regards the soil.

The general government, in its grand and sudden expansion of our navy, almost stripped some of the best sections of the whole country of its very timber—the white oak—which has gone to the navy yards and contrac docks in untold quantities.

IMPROVIDENT WASTE.

Men, in their haste to get their land under cultivation, girdle and burn tracts of the most magnificent forest, while they could, with the greatest ad age to the crops, and the general health and the beauty of the country, l every field with a fine belt of timber, from two to eight rods in width, surr ing it on every side. The disadvantages which men imagine to result fr shading of their fields are, by most beautiful compensations of nature, b summer and winter, more than twofold made up to them in blessings and p So thoughtless and reckless are men in opening up their farms, they d even have forethought to select the knoll and save the forest where nature cated should be set the future house. That very spot is bared of its trees at length he sets his house upon it, large, imposing and costly, and twenty later he finds himself beginning to enjoy a meagre artificial shade, prepared long toil and heavy expense.

DESTRUCTION FOR LIQUIDATION OF FARM DEBTS.

When wood commands a high price, and farmers can sell it, and, by rem it, can put in a larger breadth of grain, also commanding a high price, covetousness leads them to cut and sell as long as one stick remains on the more than just enough to keep up the fences poorly. This course also deg the quality of our forests. First, the trees suitable for sawing fall; then which can be hewn; then those choicest for firewood are culled out, an forest becomes crooked, gnarled, and composed of comparatively worthless the grander and more valuable species having been utterly extirpated

REPRODUCTION PREVENTED.

Many, with great labor, have cleared out the underbrush, and have s down their woods, to make noble parks, or to procure range and pastu their cattle. They do look beautiful, smooth, and pleasant to the prop himself and every passing stranger. But is it well? Others, in time of dr or to save a little pasturage or fodder, turn their cattle into their w Thousands of young trees are eaten, or torn up by the roots, while other sands are broken down and trampled to death; and in a few years the new is nearly destroyed. In some of the European countries this practice is f den by stringent laws, and punished by severe penalties.

The fruits of the best nut-bearing trees, as the population increases, are in demand by the squirrels and the children, for their own uses, or by who supply the demands of commerce. So that some noble trees that wo all in their power to propagate themselves, annually shower upon the bushels of nuts; and yet, at the end of a generation, cannot show one pl vigorous growth as the result of all their generosity and labor. The co trade, meanwhile, beyond any other, penetrates the most thrifty forest gathers the choicest saplings by millions. It is a common sight at St. L see the freight trains on the Pacific railroad enter the city with from four platform cars loaded with hoop-poles, to the top of stakes six feet the platform of the car. This is a new road, but a few months complete the woods furnish a fresh field for this devastation, to last, however, but few years ere all will be exhausted. But the farmers, as if determined to

ıction of the woods complete, in many instances turn their swine into ds, not only to root up and trample what plants were left by the catlso to devour the last stray kernel of mast that remains.

PREVENTIVE MEASURES PROPOSED.

ything be done to check this destruction? and how? Call the attenll owning forests to the methods of economizing their timber. Enıem to permit none of the more valuable kinds of timber to be removed ıas reached a fair maturity, remembering that each year's growth is ıan any preceding year's accretion. A sapling ten feet in height and s diameter may add in one year a ring of wood one-third of an inch in and may increase its slender top by four feet of additional height; ıt of wood actually grown for that year will be equivalent to a strip ne inch thick and two inches wide at the butt, and one inch square at nd fifteen feet long. But thirty-five years later, when it shall have ı diameter of two feet, when it shall stand eighty feet in height, let us ıeed with which it makes lumber. Assume the diameter of the coat of osited to be one-quarter of an inch, and we have for a single year's y averaging the height and diameters, the equivalent of a solid plank *wide, two inches thick, and forty feet in length.* Timber which stands ted in the forest, with suitable room, and which is making vigorous ıould, by all means, be spared as long as possible. The timber which ly worthless for purposes of usefulness and manufacture should be red used for fuel.

mistake exists in the minds of men as to the relative values of difıds, as to their ability to produce heat. Certain kinds of wood are by the purchaser because, when he has to pay for preparing and wood to burn, he wishes it as solid and as lasting as he can obtain it. wer rates at which he may obtain other wood than hickory and hard y, on examination, prove to him that it is economy even to buy, preuse a greater quantity of other kinds. I therefore introduce a few ı the carefully and exactly compiled tables made by Marcus Bull in ments upon American woods. His ninth table shows "the value of quantities of each wood, as compared with shell-bark hickory as the and marked 100." Out of forty-six different woods of trees and perimented on, only *five* stood under *fifty*, or were of less than half of shell-bark hickory; these were Lombardy poplar, white pine, pitch y pine, and white birch, which stood respectively as follows: 40, 42, . Hard maple, generally considered as next in quality to hickory as ound to have a value of *only sixty.* There were eighteen of the vawood experimented on which were more valuable, foot by foot, than e, ranging from 60 to 80, while white oak and red-heart hickory , chestnut and white oak 86, and pig-nut hickory 95. Many of the ing trees, oftentimes cut and burned in the clearings, were found best heat-producing woods.

ving trees let a view be had to the protection of the remaining forest, se decaying and liable to fall, and those that have become insecure ble to be uprooted by violent storms. And care should be exercised rees, not only to facilitate the removal of the logs and wood, but also breakage of the remaining trees. And by all means entirely exstic animals from the woods. Encourage the farmers of our land ly the cherishing and reproduction of their timber. Let the trees of alue be cut out for wood, and thin out the poorest of the trees where too thickly. Take away large branching and yet indifferent trees woods are sparse, and set young trees and plant nuts of valuable va-

rieties in the area thus opened, and let the sunshine and the air *sta* *together*, that they may grow thriftily and advantageously. As a natio ignorance and stupor exist among our farmers respecting this subject. 2,240,000 farmers would each give but one hour of real thought to this and then practice upon their own thoughts, the result would profit this tens of millions of dollars.

Our farmers should consider the ultimate pecuniary benefit of such a for themselves, and their children after them, both in the better incom their farms and their greater value to their families if in time they sh sold. We are cutting down too much of the timber and removing the e and grand instrument which God uses in nature for greatly controlling tremes of temperature and moderating the violence of ærial disturban inequalities of all kinds. Cutting off timber to raise grain will, when *far enough*, change those rich grain fields to moderate grass lands. Th of the goose that laid the golden egg should check our thoughtlessness a us to save our timber, and even produce more, and cultivate with great and thoroughness the present fields.

NATIONAL SCIENTIFIC EXPERIMENTS NEEDED.

Let extensive, protracted and scientific experiments in the propa cultivation of forest trees be established. In European countries v have been expended, and years—yes, *lives* of eminent men have been observation and experiment upon this subject. Laws have been pass tecting the forests from injury by cattle and from depredations b thieves, limiting the amount of wood which may be cut, and requiring plant trees. But this knowledge is of comparatively little advantage The books are mostly written in foreign languages; they are, to a great scientific works, and would not be suited for general use and instructic were they translated in the most scholarly manner. The climate, s trees of Great Britain are dissimilar to ours, to so great an extent works written there would be inapplicable to our vast area, with its g tremes of latitude and its great changes of temperature. Our country, general excellence and variety of its timber, exceeds Europe and dema we should study and learn for ourselves what our country can do for it trees, and what our trees can do for our country. The pursuit of t knowledge involves the use of so much time, and the expenditure of s money, that when a nation is as ambitious of material progress, and a for gain as ours, study on this subject, as an individual pursuit, will be neglected. This subject should receive the immediate attention of our ment, and enjoy its fostering care. No private efforts, however exper extensive, would so much impress the great mass of the people with the diate and pressing importance of action as to have Congress make som ment worthy of a subject so grand, and an interest so vast. There are objections against the government attempting such experiments itself, rectly under its own authority and inspection. It would need to be a some department already existing, and overloaded now with the overs other great and varied interests. The experiments ought to be carri sections remote from the seat of the general government, and would n appointment of agents and overseers, who would serve simply as app and not because they were drawn to the work by their natural tastes a high estimates of its importance. The experiments, to be of any valu be continued through several presidential terms; and in the continual occurring in the various departments of government, no one person w permitted to control these experiments, to carry out to completeness tho digested theories and test them in actual practice, and to avail himsel

own experiences, knowing which to truly condemn and which to approve. The liability would be a defeat, through incompetence or lack of interest in the men appointed to the work, from the short periods with which they would be connected with it, and the fact that they had no personal interest at stake in it except their salaries.

On the other hand, no company of men can, in the present state of ignorance, afford to buy lands, and then propagate trees at an expense of twenty to thirty times the value of the land per acre, and wait twenty years for the return of the money in fire-wood and lumber. Men must live—they need present money; they wish immediate income from their labor and investments. If in any manner the government could aid any competent corporation of able and scientific men, either by grants of money or grants of public lands, to assume a faithful and thorough fulfilment of certain definite and important experiments, made extensive enough and continued long enough to settle certain great facts—to determine certain sure methods of culture, and to place in the United States, within fifteen years, the art of sylviculture (or tree-growing) on the same basis as wheat-growing—to bring it to a forward and certain position, which it will not otherwise attain in forty years—then it ought to be done. The great objection to this plan is, that the government is dependent, to a certain extent, on the faithfulness, capacity or honesty of those to whom it intrusts this great work. If, then, the government, in the furnishing of means to such parties, could keep such a control only as should secure the faithful performance of the agreements made, and also make it for the ultimate personal benefit of those conducting the experiments to carry them to completion in the most perfect mode, the object would be probably obtained in the best, most satisfactory, and most economical manner.

Whatever course may be adopted in this matter, it is hourly assuming an importance with thinking men that will not permit it to rest. Action, for which in twenty years sixty millions of citizens will return devout thanks, is demanded, and it should be taken without an hour of unnecessary delay.

BEGINNINGS ALREADY IN OPERATION.

Every word that has been written, printed, or spoken in our country on this subject has been a blessing, and the author deserves public thanks. Every man who has experimented, to however small an extent, whether led thereto by his own necessities for trees, or by love for the employment, has been a public benefactor. Like the "cloud no bigger than a man's hand, just rising from the sea," an awakening interest begins to come in sight on this subject, which, as a question of political economy, will place the interests of cotton, wool, coal, iron, meat, and even grain, beneath its feet. Some of these, according to the demand, can be produced in a few days, others in a few months, wool itself in a few years, but timber in not less than one generation, and such as we are daily destroying in not less than five to fifteen generations. The nation has slept because the gnawing of want has not awakened her. She has had plenty and to spare; but within thirty years she will be conscious that not only individual want is present, but that it comes to each from permanent national *famine* of wood.

We should hail every movement in this direction of increasing interest. The State Agricultural Society of New York has offered last year, for the first time, a premium for the best acre of forest orchard. I have not seen the proposal, but think the amount is $200; and the only thing specified as required is that a given number of trees should be set out. All honor to that society in its noble beginning! Mr. Douglass, of Wisconsin, will long deserve the thanks of this nation for his patient and successful experiments in domesticating and successfully propagating in this country the European larch. Close by the region

of native pine, so rapidly melting away, he is seeking to introduce and encourage the cultivation of the larch in all that region of country. May success attend him, and an abundant reward! In connexion with some of our colleges, and contemplated in the future by some of the agricultural colleges, and in some few instances owned by men of great wealth, are found arboreta, or gardens, or grounds in which are collected all varieties of trees which can be made to endure the climate; and sometimes the collections are extended so as to include many shrubs and trees which can be grown only under glass and with constant protection. For the advancement of science, for the use of the naturalist, the philosopher and the student, such collections are of great value, bringing the practical examination of these productions of nature within the reach of many whose time, circumstances, or means would not permit them to visit foreign countries. One of the largest and finest collections of this kind in the United States constitutes one department of the Missouri Botanical Garden, which is the property of a wealthy citizen of St. Louis, and is situated some two miles southwest of Lafayette Park in that city. These grounds are probably unsurpassed by any in the United States, either public or private, in their extent, their beauty, the completeness of the collection of plants, shrubs and trees, or the skilful cultivation and the lavish expense bestowed upon them. Although private grounds, they are thrown open to the public by their proprietor, Mr. Henry Shaw. Tens of thousands have enjoyed their beauty, many students have spent happy and useful hours there, and the effect upon the landscape gardening and the beautifying of yards and private grounds from this example has been immense. But the arboretum, which contains *one* tree of each known variety, does not meet the particular want of which we are speaking, though, as we have stated, their presence helps to arouse and instruct the nation. It is such governmental action as has been recommended, with such action as I am told has just been taken by the legislature of Kansas, which is to bring us relief, if it ever comes. The State of Kansas, to encourage the planting of trees, not only remits the taxes upon all planted forest, but pays annually, through a period of some twenty years, a bonus of one dollar an acre to the planter. To persons who think there are in our country trees enough this may seem a strange expenditure of money; but it will do more than any other expenditure to replenish the State treasury in all future time. The facts I have mentioned show that light is beginning to struggle through the darkness. Let the people, then, have immediate true, and reliable information, such as only such courses of experiments as have been spoken of above can give. They are ready now to receive it. Let them also have an opportunity to see what has been, and is, from year to year, being done at such propagating grounds and plantings. If this is done, there is no reason why arboriculture may not become throughout all our land as distinct a department of our agriculture, as well understood, and as certainly managed, as breeding, herding, wool-growing, dairying, or raising grain.

An effort is now being made with the government to obtain and diffuse intelligence on this subject. In the spring of 1865 a company, of which the writer is a member, was incorporated by the legislature of New York, under the name and title of the "American Forest Tree Propagation and Land Company." The said company, having duly and legally organized, have applied to Congress, asking a grant of public lands, the far greatest part of whose proceeds are to be expended in making the experiments; the remainder of the land, with the plantings thereon, to be the reward of the company. It may properly be questioned, why should they ask the government for such assistance? Why not carry forward the enterprise by individual energy and private expense?

Let us then inquire, why government should aid such efforts? *The work national.* Every part of the land suffers together. In the pineries then

man cannot now build for double what it cost a few years ago, because the emand for lumber, its increasing scarcity, and the price of labor control the ce. It will take the man no longer to chop the logs, nor the mill longer to aw them; but all things have gone up in price; and (leaving out the fluctua ions in currency and prices caused by war) there is no one thing in our land which has more certainly caused the present high rates of labor than the high rice of fuel for all domestic and manufacturing purposes, the high rents for he industrial classes, and the high price of the raw material upon which nearly half million of our industrious, intelligent mechanics labor for their bread. very citizen in this country is interested in this question, both directly and ndirectly. Every one must have his house to dwell in, either his own or some ther man's; every one needs his victuals cooked and his tea and coffee warmed; very one, for health of body, needs a genial fire in the inclement days of inospitable seasons of the year.

Bernard Pallissy, the famous "Potter of the Tuilleries," who died in the ile for his religion in 1589, was one of the most profound men ever proneed in Europe. He then plead for the wood in France as follows, (see G. P. h, "Man and Nature," page 296:) "Having expressed his indignation at folly of men in destroying the woods, his interlocutor defends the policy of ; them by citing the example of divers bishops, cardinals, priors, abbots, eries and chapters, which, by cutting their woods, have made three profits— ale of the timber, the rent of the ground, and the good portion they reed of the grain grown by the peasants upon it." To this argument Pallissy : "I cannot enough *detest* this thing, and I call it not *an error, but a urse and a calamity to all France*; for when forests shall be cut, all arts shall , and they who practice them shall be driven out to eat grass with Nebuezzar and the beasts of the field. I have divers times thought to set down writing the arts which shall perish when there shall be no more wood; but n I had written down a great number, I did perceive that there could be end of my writing, and having diligently considered, I found there *was not* which could be followed without wood." * * * * * "And truly I ould well allege to thee a thousand reasons, but 'tis so cheap a philosophy that very chamber wenches, if they do but think, may see that without wood it possible to exercise any manner of human art or cunning."

But there are many persons who, living in the near vicinity of coal, unlering the infinite uses to which wood is serviceable especially, smile at the that the coal can ever be exhausted, or that it cannot readily take the place rood as an article of fuel. Now, there are certain simple and evident truths ed to be considered. The more dependent the nation becomes upon the mines ts fuel, the more liable will be both the owners of the mines and the commuat large to be oppressed by combinations and strikes among the miners. ready scarcely a year passes without such occurrences in the leading mines, ducing anxiety and suffering to tens of thousands, and exacting unjust rges from all who are consumers. But again, the larger the regions deed of lumber, and also destitute of coal, the greater the distances over which has to be transported. This enhances its price and increases the uncerof receiving a supply. Again, as the mines are worked longer and are deeper, or are drifted further into the mountains, the cost of getting out coal increases, while other mines will prove unprofitable and will be abanmed, and others will be utterly exhausted. An article in the London Times, as April 19, 1866, speaking of the duty of England to pay her national t now, while in the zenith of her power, talks thus on the short supply of n that nation: "But we must look beyond this century. In THREE GENTIONS—that is, in the days of our children's children—we are told that *all l of these islands that lies within four thousand feet of the surface will be usted if we go on increasing our consumption* at the present rate. Coal is

everything to us. Without coal our furnaces will become idle, our factori workshops will be as still as the grave, the locomotive will rust in the and the rail be buried in weeds. Our streets will be dark, our houses uni itable, our rivers will forget the paddle-wheel, and we shall be again se by days from France, months from the United States. The past will len its periods and protract its dates. A thousand special arts and manufac one by one, then in a crowd, will fly the empty soil, as boon companio said to disappear when the cask is dry. We shall miss our grand depen as a man misses his companion, his fortune, or a limb, *every hour* and at turn reminded of the irreparable loss. *Wise England* will then be th *virgin* without oil in her lamp. We shall be surrounded and overwhelm the unprofitable lumber of buildings and machinery that we cannot use with cities we cannot occupy; for who will care to live in Manchester? will be able to live in the metropolis? It is not so difficult to imagine the we shall return to, for it takes only a middle-aged man to remember it. would be sorry to be called *old* who can remember large towns lighted w lamps, the first steam vessel timidly creeping along our shores or up our and the hardly credited rumor of a steam engine on a 'tramway.' Bu process of learning will be slow, and neither easy nor pleasant. To be su coal becomes scarce and dearer we shall learn economy. We shall war houses more scientifically and improve our machinery. But meanwhile o scendants will witness another process equally exhaustive; the *populatio* follow coal wherever it is to be found, whether on foreign or on colonia Our manufacturers will be beaten by those who then have this advantag us, and the working classes will accept the invitation of the master tha the highest. That is what they must do, for it is the law of existence. not easy or at all possible to forecast any point at which the various confl causes may fix the future of English labor, but we may as well expect a population in Salisbury Plain, as a Manchester, a Liverpool, a Sheffield Birmingham *without coal*, and *cheap coal, too!*" Such are the views so re set forth by the London Times, asserting that the coal will be exhausted it will result in the prostration of British commerce and manufactures, a ultimate depopulation of the British isles; and hence it urges the nation t its debt while this source of wealth and strength is still theirs.

Should not such words as these arouse Americans to the value of wood, has a value in our nation of probably *four times* its value as mere fue which, in the mere department of fuel, can do for all purposes except th foundery and steamships upon their long voyages on the ocean, all that anthracite or bituminous coal can do? Already the United States in its period of existence has acquired a population equal to that of Great Britai all things would indicate that the nation, as regards population, is still infancy. We say, then, that government should regard this interest, be every person will be pecuniarily interested in it—it is national.

2. *Government should aid* in the development of this knowledge an ence, because it is not remunerative to those who would do it privately. I pay every man who owns a farm which has a scarcity of timber to begin, some systematic plan, the planting of trees, each year to invest some m and give a few days' labor, thus steadily, persistently, but with small ex and little derangement to his other agricultural arrangements, supplying want. But if he will undertake to plant trees as an experiment for the of others, and make this his first and main occupation, he will both fail in ness and starve in person. While he could raise one tree to a size suitab any manufacturing purpose, he could, from the same ground, have sent market twenty crops of corn, wheat, grass, or hemp, or twenty shearings his flock, cutting from the tenth generation of bucks and ewes raised by self, or could have sent eight generations of fat beeves into the market.

will those who undertake such a work as ought for the nation to be done compelled to make a vast outlay of money, but they will also expend their and lose not only the interest of their money, but also the means of living m year to year. The time when farmers are most busy will be the very when these persons will also be the most engaged.

The knowledge obtained, and impulse given to tree-growing, will be realized future generations more than this ; and as nations have lives extending over ries, while individuals live but for years, the nation should reward its real factors while they live.

The waste portions of the republic will in time thus be reclaimed, a larger be subjected to cultivation, a greater population maintained, and thus the uon in coming ages be increased in happiness, in numbers, in strength and h.

EXPERIMENTS SHOULD BE PROTRACTED, THOROUGH, AND VARIOUS.

There should be selected, with great care, suitable grounds, in various locali- in the bounds of the United States, to be tilled and used as nurseries, in ler that the best, surest, and quickest methods of propagation may be cer- learned ; that all the debated questions, whether to propagate and trans- or to plant and till where the trees are ultimately to stand, may be finally truthfully determined ; that the proper time in the season, and the best er and the best age of the trees for transplanting, may be learned ; that kind and composition of the soils used in propagating, and the most prom- ig soils into which to plant, may be all proved. The influence exerted by es upon each other, as to their health and thriftiness, a subject of immense portance, and of which scarce anything is known, should be thoroughly in- tigated, and not respecting a few kinds of trees, but of all those whose size l peculiar qualities will make them valuable either as fuel or lumber. The te of the atmosphere, the temperature, the amount of rains, the presence and ion of winds, should all be accurately observed and registered, and their s upon the propagating or upon the young trees should be noted. The tities of seed planted, its previous preparation, the location and prepara- i of the beds, and the various methods of planting, together with all results, cessful or unsuccessful, should be recorded.

When the trees are planted the experiments should be many and often re- d, at what distances they shall be set, whether in lines equidistant or in wide apart, but the trees standing close in the line or in lines arranged so o cause the trees to stand quincuncially; also, to determine the effects of e upon the growth of trees, and to study the arrangement of small and n-growing trees in artificial forests, to learn the effects and secure the power light and heat to all. Trees also should be planted in various forms, as -breaks, orchards, lines to defend fields or fruit orchards; also with the est species to the windward, and the rankest growing varieties on the lee- ; also in long parallels, especially to test their effects upon important me- ogical points, sought to be established thereby. These trees should be ed from year to year, and an exact record kept both of height and cir- rence, the extremes of each species being noted, and then the general for the season determined for each kind.

Not only should the experiments embrace the trees of America, but some ex- ents should be made upon the domestication and propagation of some of o European and other trees ; and not only should our forests of America planted as we find them standing in nature, in various latitudes and longi- , but these should be mixed, and foreign trees intermingled with them.

An account should also be kept of the number of trees of each species annu- injured by animals, insects, accident, storm, heat, cold and disease, speci-

fying by which destroyed; also a full account of the cost of propagating, set ting, and cultivating, not only in the gross amount, but by particular items, s .hat the knowledge may be reliable and exact for others.

A full annual report should be made of all the things tested by the exper ments and sent to the Department of Agriculture, and, so far as may by it b deemed desirable, be spread through the country in the monthly annual issu of the department.

The writer, and others most conversant with the subject, think that the e: periments should continue through not less than ten years of active labor, n less than forty varieties of trees indigenous to this country be tested, nor tl experiments be limited to less than 1,000,000 trees. Less than this wou leave the work so feebly and slightly explored and accomplished that it oug to be done again. This, therefore, is the *very least* that the magnitude of tl object can ask

The cost, perplexities, risk, labor and study demanded for this enterprise not conceived of by one person in 100,000 of our citizens; but a moment's co sideration will set them on a correct train of thought. While the number American trees worthy to be tested is about forty, but few of these, and tho the most readily grown, are found in our ordinary nurseries. Trees such : should be grown to make these experiments of any value wholesale at from te to twenty-five dollars per hundred, and retail at prices from twenty-five ce to one dollar each. Being almost wholly demanded for ornament, the call them is very limited, and they are raised in the nursery in the same manner : other trees, in closely standing rows, and thick in the row. The soil is of tl finest quality, and worked with great ease. No extra fencing is required, an when the nurseryman digs them up he transfers all further care of them other parties. He receives his money for the work performed, to be again i vested in the same manner.

In the case of such experiments as have been mentioned above the circur stances are wholly different. With the first moment's work commences an outla of expense which will make no return under fifteen years, and then only firewood. All the expense of making the experiments must be laid out befo any income can begin to return. A railroad or a telegraph, or a ship compan almost from the beginning of their work commences receiving income; in such work as this there is none. When the nursery work is far advanced, and tl trees are ready to be removed, then the labor is but begun. New soil must l broken up to receive the trees, and it will require great breadths for this pose. It is a great and costly labor to mark out and set 100,000 trees in season. The new lands thus planted must be fenced either with wooden live fencing, or the trees will be destroyed.

The trees must not stand, as in an ordinary nursery, crowded upon a sma space and thickly in rows, but each needs a location where it can be singly cu ·tivated. Neither should the experiments be made on one piece or tract of land· this would be economical—but the experiments on varieties and adaptations soil, and on all thermometrical, hygrometrical, and pneumatical points, would defeated thereby. In sections destitute of trees, one dense and large forest not so much needed as many and scattered ones of much smaller size. If tl plantings should thus be scattered, men and teams must be sent to great di tances, and in various directions from a selected centre. The force of men an teams required for this work, it is supposed, after careful estimates, will be fro five to six times as great as would be required to treat the same number of tre to seven years' growth in a common nursery; while the expense attending tl completion of a tree plantation will probably be five times as great as the co of raising and disposing of an equal number of trees from a nursery. Such e periments ought to be commenced without delay. The annual taking away 3,000,000 of acres of our wood-growing lands is cutting down and sweeping

ır forests with frightful rapidity. Kansas, Nebraska in part, the whole of 'tah, New Mexico, much of Texas and California, have not one sapling to spare. s population rolls into these regions, and the railroads are built through them, one destitution, and the great drawback to every kind of business and to u prosperity, will be the lack of timber.

East of the Mississippi river, excepting the prairies, the territory of the United tates is all timber-growing land. West of the Mississippi, the plains, the bad nds, and the sandy deserts, occupy probably two-thirds of all our domain. oon those distant States will begin to draw upon the more favored sections, se States now impoverishing themselves will have to share their rem- with others. This country still enjoys the blessed ignorance of not know- what it is to purchase her common timber abroad. As yet we have imported r ornamental woods from other countries; but when we cannot supply our wn artisans with our own wood, then, indeed, will it be a day of sorrow. Is t not time to change some of our soil, either bare of trees by nature, or denuded y violence of man, into tree-bearing land?

l ons of dollars are yearly paid for wood fuel, and the demand increases ly. Fully ten millions of dollars' worth of railroad sleepers are now an- ly called for by the railroads. More than one hundred millions of dollars' h of sawed lumber is now consumed yearly, while the addition of timber for and naval purposes, for home manufactures and cooperage, will probably aggregate to $250,000,000 per annum. Such is the yearly destruction. u y the nation begins to feel the drain and the scarcity; and to counterbal- even in the least degree this waste, such experiments as we have urged ld be set on foot without a day's delay.

't will take at least ten years to arouse the people to any considerable extent. re man to begin to-day, it would take twenty years to produce one good oak r chestnut railroad sleeper. Before it would be ready for market the railroads ill have paid for sleepers alone more than $300,000,000.

The Department of Agriculture, better than any other agency, can communicate valuable information as these experiments would develop to the citizens e. The publications of this department reach the very men upon whom ı depends, the owners of the soil. But mere writing and printing are not to produce the desired impression and movement upon the masses. ey want experimental demonstration; and merely individual, limited, and local nents will not satisfy them. One person may write about planting a few a few butternuts or black walnuts, or a few chestnuts; another about a little locust seed, and another about setting cottonwood cuttings. They well enough in their way, but they are meagre, imperfect, unsystematic transient, as well as private. It should, then, to command public con- e and wide adoption, be known that such experiments were being made on nsive scale by the government itself, or with its aid, and that all are o visit the nurseries and plantations to see the work performed, and to make ries into the minutest particulars.

hen the information given by the government would be sought with greater st, year after year, as the developments became more certain and confirmed; h information would be considered authority on the subject. And thou- s would even go great distances to see the actual working of the plan who sleep reading over the theory and description.

WARNINGS FROM HISTORY.

We ought to learn from the experience of other nations great and terrible les- without madly insisting upon suffering the same disasters ourselves. The of the world presents to us a fearful record respecting the destruction of Palestine and Syria, Egypt and Italy, France and Spain, have

seen some of their most populous regions turned into forsaken wilderr their most fertile lands into arid, sandy deserts. The danger to our lana is nea at hand, NEARER BY FULL THIRTY YEARS than the most intelligent suppose we need immediate action both for prevention and restoration.

Hon. G. P. Marsh, than whom no man living is more competent to speak o this subject, thus warns his countrymen. His extensive travel, his high schola ship, his official position as United States minister to several foreign nations, hi wonderful powers of observation and deduction, give to his words, verified b his own personal observation of the subject on four continents, the greates authority and power:

"There are parts of Asia Minor, of northern Africa, of Greece, and even Alpine Europe, where the operation of causes set in action by man has brough the face of the earth to a desolation almost as complete as that of the moon and though, within that brief space of time men call the "historical period, they are known to have been covered with luxuriant woods, verdant p ure and fertile meadows, they are now too far deteriorated to be reclaimable by nor can they become again fitted for human use except through great geolo changes, or other mysterious influences or agencies of which we have no pr knowledge, and over which we have no prospective control.

"The earth is fast becoming an unfit home for its noblest inhabitant, an another era of equal human crime and human improvidence, and of like duratio with that through which traces of that crime and improvidence extend, woul reduce it to such a condition of impoverished productiveness, of shattered surfac of climatic excess, as to threaten the depravation, barbarism, and, perhaps, eve extinction of the species.

"The destructive changes occasioned by the agency of man upon the of the Alps, the Appenines, the Pyrenees, and other mountain ranges in c and southern Europe, and the progress of physical deterioration, have bec rapid that, in some localities, A SINGLE GENERATION HAS WITNESSED THE GINNING AND THE END of the melancholy revolution.

"It is certain that a desolation like that which has overwhelmed many o beautiful and fertile regions of Europe, awaits an important part of the terri of the United States, unless prompt measures are taken to check the action destructive causes already in operation. It is in vain to expect that legi can do anything effectual to arrest the progress of the evil, except so far as u State is still the proprietor of extensive forests. Both Clavé and Dunoyer agr that the preservation of the forests in France is practicable only by their transf to the state, which alone can protect them and secure their proper treatmer It is much to be feared that even this measure would be inadequate to save forests of our American Union.

"There is little respect for public property in America, and the federal go ernment certainly would not be the proper agent for this purpose. It itself unable to protect the live-oak woods of Florida, which were intendea to preserved for the use of the navy; and it more than once paid contractors a hi price for timber stolen from its own forests.

"The only legal provisions from which anything can be hoped are such shall make it matter of private advantage to the landholder to spare the t upon his ground, and promote the growth of the young wood. Something be done by exempting standing forests from taxation, and by imposing ta wood felled for fuel or timber; something by premiums or honorary distin for judicious management of the woods. It would be difficult to induce gov ments, general or local, to make the necessary appropriations for such pur But there can be no doubt that it would be sound economy in the end."

Such are some of the thoughts and words of this eminent scholar, and observer, published after this company had been fully organizea, years in contemplation. His whole book, "Man and Nature," bears t

on every page to the existing wants and evils already upon us. and which make the action of government an instant and imperative necessity.

WHAT CAN BE EFFECTED BY SUCH EXPERIMENTS.

How much could be accomplished of absolute tree-planting as the results of such experiments and information?

No exact and positive answer can be given to this question. We can, however, upon very low and probably safe data, show what could be accomplished were those data adopted practically, and thus made facts. There is a possibility that from such experiments, whether by the government or by a company, it might become proven that a great forest nursery, under scientific and skilful management, might supply farmers with trees to set for forest, better and cheaper than they could themselves propagate them. And thus a trade might arise, if sufficient interest could be awakened in it, which would furnish every farmer with such and so many trees as his time and inclination might from year to year lead him to plant. But whether he shall propagate them himself or purchase them is immaterial to our estimate, which is as follows:

There were in 1860 in the State of Illinois 143,210 farms in cultivation. Let us suppose that only *one-third* of these farms were prairie lands; and again suppose that only one-third of those having farms bare of timber take any interest in the subject, and that these take so little interest in it that in ten years they shall plant but five acres to each farm. Then one farm in nine through Illinois would plant one-half an acre of forest orchard each year; and yet, in the aggregate, it would amount to 90,000 acres of forest, equal to 270,000 acres of common forest, or 156 square miles, or four and a half townships. It should be remembered that it is estimated that one acre of scientifically and mathematically selected and planted forest is equivalent, in ultimate amount, to at least two acres, and in value to three or four acres of ordinary forest; so that the acres planted and grown in replacement are entitled to count far higher than simply acre against acre. Does any one exclaim, "This seems but a drop in the sea?" A beginning certainly must be made, or nothing will ever be done. If the timber of this nation is saved or restored, it is to be accomplished by labor and planting, and the sooner all are aroused and commence the better.

INDIVIDUAL EFFORTS ON TOO SMALL A SCALE.

Some few persons of large means in this country, with a simple view to beauty, or to meet their particular plans in conducting the various branches of the farmer's profession, have laid off their farms with great care and excellent judgment for the ends sought to be secured. But such persons often purchase the farms they own and thus beautify; when these come into their possession, the roads and lanes, the shape and location of the woods, and the general plan of fields, are all settled, some of them in a manner which cannot be changed or modified. But to find farms that have been laid off with a view to future years, or on any general and carefully considered plan, which could be repeated indefinitely on every side, [illegible] will look in vain.

[illegible] are generally so small, and the persons who open and improve them so poor, that they have neither time, room, nor money to commence their [illegible]it, and for their own future interests. It would require combination [illegible]y neighbors, a well matured and faithfully followed plan, and a high [illegible]e, to so alternate and arrange forests and arable lands as to accord with certain great principles in nature, which, if regarded, would enrich and benefit all who come within their influence.

As it is now, each farmer by his own notion, often with no sound reason, clears one part and leaves forest on another portion. No one studies his neighbors'

farm, or questions him as to what he intends to cut away or leave, and thus he is wholly ignorant of what the surroundings of his own farm will be. Each farm ignores the existence of any other on the whole continent. No *two*, much less *five, ten, twenty*, or *fifty* neighbors come together and enter into an intelligent agreement, fixing upon plans seeking to control or modify the severity of winds, droughts, frosts and winters, and to secure frequent, abundant and perennial springs of water.

There are in our country some extensive tracts of forests still unbroken, or but just penetrated by the pioneer, where it is possible that some system might be adopted by the settlers, *however poor*, which shall show to the country and the world how beautiful, healthy and productive a country man can make by preserving the forest in its full proportion to the cleared land, and in the proper forms.

And should the government, or any company, ever execute experiments on a scale such as this interest demands, then, certainly, upon those portions already by nature ready for the plough, there should be given a specimen of what can be done by study, science and forethought to make agriculture, and rural scenery, and farm homesteads what they ought to be.

THE MAKE OF OUR COUNTRY DEMANDS LARGE FORESTS.

Geographers, by an averaging of the coasts and boundary lines of the United States, have fixed its geographical centre in the State of Kansas, about twenty-five miles west by six miles south of the city of Leavenworth. This is the real centre, though far too much to the west for the probable centre of population. The thermometrical observations taken for many years at Cantonment Leavenworth (while that was still "Indian" and then "Nebraska" Territory) showed "that Fort Leavenworth was subjected, beyond any other part of the United States where similar observations were made, to sudden and extreme changes, both of heat and cold, of moisture and drought." (Authority of Major E. D. Ogden, U. S. A., 1854.) Since the settlement of Kansas the terrible droughts experienced, and the many men who have perished with the cold on the plains between Leavenworth and Salt Lake, bear evidence to the truth of the observations.

And this is to be expected in the nature of things. There is no body of water in the central part of the North American continent, west of the Mississippi river, which is able to exert any controlling influence upon the temperature of all that region. When we go north from Fort Leavenworth five degrees we are in a cold and frozen climate, closed early in the fall and locked in frost until late in the spring. Pass five degrees southward, and you have almost forsaken the region where ice may be said to form; hence this middle ground is wholly controlled by the prevailing type of the season, interspersed with the sudden and ofttimes violent interjection of short periods of temperature from the opposite points of the compass. Thus the general winter may be mild, without snow, with scarcely frost enough to prevent ploughing a single week through the entire winter, and there may come one, two, or five days, when the thermometer shall stand anywhere from zero to 26° below zero. On the other hand, in a long, cold, snowy winter, a period of very spring or early summer, as regards its balminess and comfort, may break in with equal suddenness. The same latitude upon either the Atlantic or Pacific coast is no criterion by which to judge of the temperature of the plains. The presence of a great ocean, with its broad, open bosom continually exposing to the biting air the fresh warm currents of her inmost being, gives a stability and produces a control over the temperature which is unknown when we reach a point almost two thousand miles from each ocean, and one thousand from the Gulf of Mexico. No portion of the world more needs the presence of great and numerous forests to preserve

ruilibrium of temperature than the central parts of North America, and es-
ally upon this latitude, which, as it approaches either ocean, is so admirable
so much sought for.

he same causes which produce such instability of temperature have an
ost equal and direct effect upon the amount of moisture in the atmosphere.
depth of the Missouri and Mississippi are insufficient to produce much effect
temperature by their simple, positive presence; the results which are ob-
ed come rather from the processes of evaporation. I suppose that were the
uri river, from its mouth to the headwaters of the Yellowstone, to be laid
in a straight line, and its tributaries to be laid on each side of it, side by
, that the surface of that mighty river would average a mile in width by
e thousand in length, giving an evaporating surface of 3,000 square miles.
en we remember that the Missouri river discharges all the water east of the
ky mountains north of the Arkansas headwaters, except what is carried by
St. Peter's and the Des Moines into the Mississippi, it will be seen that a
e lake, sixty miles long and fifty wide, is not a large surface from which to
porate water in so vast a territory.

Iear G. P. Marsh, fortified by the ablest European writers, respecting the
ropriate proportions between wooded and tilled lands, in order to secure the
iest agricultural and healthful returns.

n 1750 Mirabeau estimated that there should be retained in France *thirty-*
per cent. of the land in wood. The forest was destroyed, with most dis-
ous effects upon the general prosperity, far faster than his estimate allowed,
the percentage was reduced far below that proportion. Marsh says: "It
vident that the proportion of forest in 1750, taking even Mirabeau's large
te, was not very much too great for permanent maintenance, though
or s the distribution was so unequal that it would have been sound policy
elt the woods *and clear land in some provinces*, while *large forests should*
e been planted in others. During the period in question France neither ex-
ed manufactured wood or rough timber, nor derived important collateral
antages of any sort from the destruction of her forests. She is consequently
overished and crippled to the extent of the difference between what she
lly possesses of wooded surface, and what she ought to have retained.
Since writing the above paragraph, I found the view I have taken of this
it confirmed by the careful investigations of Reutzsch, who estimates the
oer proportion of woodland to entire surface of *twenty-three* per cent. for the
rior of Germany, and supposes that near the coast, where the air is supplied
i humidity by evaporation from the sea, it might safely be reduced to *twenty*
cent. The due proportion in France would considerably exceed that for
German states."

Now, if the German states require 23 per cent. midway between the North
the Baltic, and the Mediterranean, what is demanded for the great area
veen the Mississippi and Rocky Mountains, almost without water from the
f of California to the Polar sea!

mind has been often impressed with the wisdom and goodness of God in
peculiar configuration He has given to this great region, and the conse-
ences resulting from it. Had the main Missouri river *come eastward*, in the
of the great Platte or the Kansas river, there would have been lost to all
nense valleys of the Missouri and Mississippi rivers one great blessing.
ssouri river from its sources runs *northward* into British America, there
an immense curve, while, running eastward, it comes to take a southerly
, until it turns with another great curve, and southeasterly cuts the State
ssouri asunder and pours into the Mississippi eighteen miles north of St.
The providential depression to the northward, eastward, and southward,
rely, causing the waters to flow by that strange route *to the northward*,
at last the Gulf of Mexico, making the distance from the mouth of the

Missouri to the headwaters of the Yellowstone about 2,000 miles longer by the channel than by a straight line drawn between the two points. When one thinks on the obstructions by sand-bars, drift heaps, snags, and the crookings of the river itself, he will understand that the water drained from the eastern slope of the Rocky mountains and all the northwestern side of the divide between the Upper Missouri and the Upper Big Platte has 2,000 miles more to travel to reach St. Louis than had it come, like the Platte, by a direct eastern or southeastern line, and that it will therefore come many days or even weeks later on that account. If we assume that the current runs five miles an hour, then that is about one hundred miles a day, and twenty days or three weeks must be allowed for the distance in traversing the great northern curve. But rapid as the river is—and it is a most majestic one when it puts on its power—the current is not equally swift in all places, sometimes being widely spread out or running in several channels. We shall assume two and a half miles per hour as its uniform motion, and then *forty days*, or about six weeks, must be allowed to elapse in calculating the coming of the mountain waters. *But this arrangement has another peculiar providence.* Had this immense curve run southward and then northward, emptying at the same point as now, another blessing would have been lost. As it now is, the spring rains and melting snows on the mountains are all garnered up in the valley of the Yellowstone and other tributaries, increasing in volume as the heats of spring slowly creep north, unlocking the ice-bound rivers. The last point that breaks under the heat and accumulating flood is the northernmost point of this great arch, and there more than 1,200 miles of rivers and melted snows are waiting with their contribution of waters; and at last on they come, sometimes earlier, sometimes later, but always as certain as the year returns; on they come, and when? The spring rains that swelled the Red, Tennessee, Cumberland, Arkansas, Ohio, Illinois, and Upper Mississippi have been over many weeks. Some of the rivers are growing low, and navigation is difficult. What shall the great valley of the Mississippi do for water, to be changed hourly into vapor by the sun, whose fierceness is becoming every hour more intolerable? Where shall they obtain water for the rain? Every rain which comes is welcomed by the boatmen, for it floats their steamers, barges and flatboats. Every rain is hailed by the husbandman because it saves and revives his crops. Spring and its rains have gone, and summer comes; and *now*, sometimes far on in June, comes the "June rise," a name of grandeur, of joy, of activity, of wealth, of harvests to all the dwellers on the stream, from the Gulf of Mexico to the far-off British line of the northwest! The river rises with the "June rise," sometimes six feet in twenty-four hours, until it stands for days at twelve to sixteen feet above low water. And sometimes, when heavy snows in the mountains are followed by a sudden, warm and rainy spring, so that the waters of the spring have not escaped before the mountain tides come riding down over them and commingling with them, come the terrific floods and overflows like that of 1844.

Is not that a most manifest and merciful provision of Providence, for all that central region of which we have been speaking, to retain that great body of waters so long for purposes of evaporation, and then, when the whole Lower Mississippi would be straitened for water for navigation, to pour this abundance through June, July, and sometimes into August, till its effects are scarcely lost before the fall rains begin to replenish the rivers? Were it not for this grand river, it is my opinion that much of that region would be utterly uninhabitable by man. And ought we because forests are wanting in all that region—shall we leave the lands to neglect and comparative barrenness, when, by adding forests as great modifiers and controllers of temperature and precipitation, they may probably become as desirable as any lands we possess, considering their locations as connected with our mineral wealth? No civilized nation

iould regard this subject with profounder interest, or prosecute it with an inner energy, than our own.

OD PAYS MORE THAN ONE-HALF OF THE ENTIRE INTERNAL REVENUE OF THE UNITED SATES.

All wood that has been so used as to make it a part of man's real estate, or hich is the staple of the man's business as a manufacturer, is taxed as real te or manufactured products. But all wood thus invested in any manner, e it pays to the owner an income, whether it is in movable or fixed form, ooi ed, if he has any income over six hundred dollars, to pay a second time ili that it has clearly produced him, except what he before paid as taxes. hus true that, in one form or the other, all standing timber, all lumber and ooa used in houses, steamboats, or permanent instruments of any kind, and l that is used in industry or manufacturing, pays a tribute to the United tates.

Let us take, then, the real estate of the United States:

In the erection of ordinary buildings of brick and stone—not cut-stone alls—and with wooden floors and joists, it is estimated that the cost of timering, flooring, roofing, wainscoting, the finishing of entrances, cornices, cuolas, doors, window-sashes and blinds, makes an expense for wood-work equal at least that for all the brick and stone work. The wood-work, then, which esents not only the raw material, but the labor necessary to put it in its plete form and appropriate use, pays one-half of the tax accruing upon that ved property. And taxes are very light upon the same land, wherever ted, when without buildings, in comparison to what they are when imved. But we must go further back.

it required, if the building is one of brick, wood with which to burn the y, making about one-third the expense of making the brick. In like maner the lime is burned with wood, and half its value arose from that expense. the clay is in the bank, the rock is in the quarry, and wagons, made greatly wood, must carry the one to the kiln and the other to the pug-mill; and, when ed, the same wagon is needed to draw them from the kilns to the place of . But then we have not gone far enough back. The brickmaker, the ourner, the stonemason, the bricklayer, the plasterer, the painter, the carer, have all needed wood in their houses for fuel, in their dwellings to shelter in their stables to protect their animals. But come to the building itself. eads and lime box, a hod and a scraper, a mortar board and a pail, is and scaffolds, inclined planes and ladders, a plumb and a trowel—wood, ooa, incessantly wood! Even for the mason, the same for the plasterer, the ainter, the carpenter, everything he grasps to work with is, first of all, wood. ar more than one-half of all the value of ordinary brick and stone buildings the United States has come from wood, and pays one-half of the taxes. ut we come to other buildings. There were in the United States in 1860 ,337 dwelling-houses, besides all public buildings, churches, educational itutions, stores, manufactories, depots, warehouses, &c. How large a protion of these were brick we cannot tell; but by far the great majority were wood. And what proportion of their cost came from manufactured wood? little hardware, a little paint, a little masonry, the plastering, and all else wood. But let us estimate a little on farm-houses. When these are built brick, the lime and brick are often burned with fuel cut on the very farm the house is erected. The barns and outhouses, and the fences, are also lly constructed of wood. Now, if we assume that the houses, barns, es give but one-half the value to the farm at which it is assessed, the land unimproved as worth half as much as when thus imthis astounding fact comes to our notice—the value of farms in

the United States in 1860 was $6,654,045,007, and the value of the lumbe provements would be $3,322,522,000. This has been cut from our soil put into these permanent improvements, and pays taxes.

Now, the vast majority of these improvements have been made within last thirty years, (probably twenty;) and as within that time, probably houses, barns and fences have been replaced sufficient to make the w amount new; during that period, on farms alone, there has been cut and annually, and changed into permanent tax-paying property, $101,070,000 w of forest. These improvements continually are growing old and falling to d But this is a single item. "A good barn will build a good house," is an a that thousands of farmers have proved true; the protection of crops, the fence of stock, the shelter of vehicles and implements, have saved thousan dollars to many a farmer. How much of the income tax paid by the far of the nation represents the wood in their utensils, vehicles, barns, stables fences, outside of the value assessed directly upon them.

But pass a moment to manufactures. The cotton manufactures are second in the United States, as reported in the census for 1860, the pro being $115,137,926; the value of flour and grist mill products being the and amounting to $223,144,369. Let us now take lumber, and contrast it these. There was of sawed and planed lumber in 1860, $96,000,000 w The products of the grist-mills furnished occupation to 19,000 bakers, be being used in every household supplied by the baker. The products from cotton-mills, besides the private use in families, in part, gave employme 90,000 seamstresses and 102,000 tailors and tailoresses. But as one-hal labor of these was expended on woollen, silk, or linen fabrics, it gave d employment to about 96,000 men and women. Now, the direct tax o produced timber was almost as great as on the cotton goods, while in the of furnishing employment to others in the simple trade of carpentry alone ploying only men, it gave business to 242,958, or nearly three times as n as worked in cotton, and thirteen times as many as worked in flour and me

The iron interest and the machinery interest (often requiring much lu are immense, but the pig iron in 1860 amounted to only $19,487,790, an bar and other rolled iron to $22,248,796, making a total of $41,736,586. machinery made in this country in 1860 amounted in value to $47,118,550 of sewing machines to $5,605,345, making a total of iron produced and mach manufactured in 1860 of $94,460,481—a million and a half dollars less the raw lumber of the country which had passed through the saw-mill.

I have before said that there are sixty-six trades in whole or in part de ent upon wood as their material for manufacturing. What they can ea do earn cannot be known; but two points will help us approximate. were 29,223 cabinet-makers, who produced $22,701,304 worth of ware; 3,510 piano-makers, musical-instrument makers and organ-builders, who $5,791,807 worth of musical instruments. If we should average these trades, we should certainly set our mark too high, as one is low, and the unusually high, demanding skilled labor. The production *per capita* was, in the first $771, in the other $1,651. Should we estimate the produ of those 476,623 artisans in wood at $1,000 each, we should have n $500,000,000 per annum, of which scarcely a trifle, excepting the two above of about $28,000,000, appears in any column of the census. This is tional to the making of the lumber itself. From all incomes over $600 United States exacts a tax.

United States buildings, capitols and public buildings belonging to th spective States, and all educational institutions and county property, and rally churches, are exempted from taxation, and therefore are of no value t this particular point of revenue, although, if they are of such vast import subserve such necessary and useful purposes, and are paid for by the mo

generally, their wood pays its tribute to the maintenance of govern- dispensing of justice, and the diffusion of religious truth and influence ie nation.

told that the manufacturers of the United States, together with the fisheries, produced in the United States in 1860, $1,900,000,000. the cotton and woollen factories, of furnaces, rolling mills, flour and , machine shops, furniture, implement and cooper-shops, of all the ring establishments of every description, what proportion of the value nd helping to produce this vast amount was wood, and paid its tax, al estate, then in incomes of proprietors?

ve spoken of dwellings, then of manufacturing establishments. We to commercial and mercantile houses. Of all the buildings used for and insurance purposes, for offices, for public halls, for theatres and for all kinds of business, and for all kinds of storage, what per cent. of lues of these buildings is wood, and, as asked before, pays a double tax? en we come to one other point, we meet timber under a new aspect. he ships of the United States had an aggregate tonnage of 5,539,812 were worth, at $40 per ton, $221,592,480. In 1860 there were a few iers, but the great mass of American vessels were built wholly of wood. remember that it is through their instrumentality that those articles ht which yield such a national income to the government, surely wood rth, demanding again the acknowledgment of its value and power ughtless men have never given to it.

re is an interest growing up among us which is destined, in time, to ery other of a mere pecuniary kind; it is the railroad power and rail- ributions; and from a few facts connected with these (I have early one or two in part) may be seen how here, as well as elsewhere, wood ribute to the United States treasury.

ort of the engineer of the State of New York on the railroads of that 1864, is in my hand, with the latest and most reliable information. d that to fence forty-nine miles of the Atlantic railroad in the lumber that State cost $35,680 70, or $728 a mile. At the same rate the the 51,114 miles, either operating or being constructed in 1862, would $37,208,992, a value greater than the entire value of the New York ilroad. Thirty-four railroads in the State of New York paid $2,311,213 s, on an aggregate of 2,798 miles of roads, which is equivalent to each mile of road. Assuming one-half of that amount for wooden iere would be required in the United States $42,817,144 for wooden ridges.

rstructure of the 2,798 miles of New York railroads cost $22,253 72; e- ith for the cost of sleepers, gives about $1,000 per mile; for the of 1862, it makes about $50,000,000 in this item.

freight stations and buildings cost $1,519 for each mile of road; -nan for wood, $760 per mile; for the United States, $38,846,000. od value in the engine and car houses, &c, in the United States is 7. The wood value in the freight and passenger cars in 1862 was, in er, $67,810,480. We thus see, upon a very low estimation, that the amount of wood in the railroads built and building in the United 1 2, 15,664,223, amounting to nearly one-fifth of all the ex- h, ne, brick, and iron.

we to e the cost of keeping up these roads, we see again the ved from this great interest is dependent upon wood. for 1864 of roadway and superstructure of the New York rail- iron, $4,747,523. What part of this was, strictly wood i li t to answer. A vast amount was doubtless ex- ; when a sleeper is broken and decayed, the

more complete and perfect the roadway, the more time, labor and expense re quired to dig out a new bed to insert the sleeper, and to properly adjust, faste and ram it. If we assign one-third of the expense above for sleepers, an placing them properly, then this item for New York alone, in 1864, wa $1,582,301, and for the United States $30,063,719. We also, in brief, other estimates from the same table:

Repairs of railroad buildings for New York $750,000, for United Stat $14,250,000; repairs of railroad fences for New York $93,236, for Unite States $1,771,485; repairs of railroad cars for New York $2,000,000, for Unite States $38,000,000; fuel (wood) of railroad for New York $3,000,000, for Unite States $57,000,000.

If, then, these estimates hold true, and they are based upon all the railroa of New York, (thirty-four in number,) long and short, rich and poor, crowde and empty, we see that in the United States the lumber, timber, and wood use for railroad purposes alone (not to build a foot of new road, but only to keep u the road, stocks, and fires) require of wood $141,085,104. But we should neve as Palaissy declared, come to the end of the enumeration, and we will stop.

But I would ask, most respectfully, that every farmer and every intellig man should ask his congressional senator and representative why we should n have, from this day forth, full tables respecting the timber, lumber, and wood our country, compiled for the public benefit in the census? This is, I believ the greatest interest of a pecuniary kind connected with our government; an all the facts connected with it should be sought out and set before the public.

Now is the time to act; we should regard and forestall the future. God h given us a great and goodly heritage—a grand and broad and luxuriant cou but it is our forests that have made this country so salubrious, so fertile. Sl we not preserve and cherish with care what remains, and plant on every quart section destitute of trees, in all our land, its proper complement of forest, unt from sea to sea it shall seem to all men "like the garden of the Lord?"

I append a copy of the new law of Kansas, to which I have alluded, an which, I think, is the greatest step towards the production of American for ever taken in this country, and one which places the entire nation under a d of gratitude to that State and its legislature:

"SECTION 1. *Be it enacted by the legislature of the State of Kansas*, That any person pla ing one acre or more of prairie land, within ten years after the passage of this act, with a kind of forest trees, and successfully growing and cultivating the same for three years, a every person planting, protecting, and cultivating for three years one-half mile or more forest trees along any public highway, said trees to be planted so as to stand at the end said three years not more than one rod apart, shall be entitled to receive for twenty-fi years, commencing three years after said grove or line of trees has been planted, an annu bounty of two dollars per acre for each acre so planted, and two dollars for one-half mile f each mile so planted, to be paid out of the county treasury of the county in which said gro or line of trees may be situated; *Provided*, the bounty hereby given shall not be paid a longer than said grove or trees are cultivated and kept alive and in a growing condition.

"SEC. 2. That any person wishing to avail himself or herself of the provisions of section of this act, shall, within three years after planting said grove or line of trees, file with clerk of the county a correct plat of said grove or line of trees, showing on what section sections of land said grove or line of trees is situated, attested by his oath, and the a of at least one resident householder, setting forth all the facts in relation to the grow cultivation of said grove or line of trees; whereupon the county clerk shall, if he find all the evidence that section one of this act has been fully complied with, on or befor first Monday in October in each year, cause warrants to be issued upon the county tre of the proper county for the bounty above provided for, which order shall be received by treasurer in payment of all county taxes.

"SEC. 3. This act to take effect and be in force from and after its publication once i Leavenworth Conservative.

"Approved February 16, 1866."

As remarked in the body of this article, I consider such an appropriati money as the most productive of any that that State will ever spend, in in ing population, reclaiming waste lands, and raising all real estate in v controlling climatic extremes and favoring the growth of all cultivated

THE ONION;

ITS HISTORY, CULTURE, AND PRESERVATION.

BY ELISHA SLADE, SOMERSET, MASSACHUSETTS.*

M time immemorial the onion has been cultivated by man, and still grows in many portions of the world. For more than 4,000 years it has been as an article of food by "all classes and conditions of men;" and there few that have not some savory remembrances of it as a constituent of those that "none can cook as well as mother." The Israelites, 1,490 years the Saviour's advent, murmured in the wilderness: "We remembered we did eat in Egypt freely, the cucumbers, and the melons, and the , and the *onions*, and the garlics."—Numbers xi, 5. Hasselquist says 'whoever has tasted the onions of Egypt must allow that none can be had in any part of the universe. Here they are sweet; in other countries y are nauseous and strong. Here they are soft; whereas, in northern parts y are hard, and their coats are so compact that they are difficult of diges- Hence they cannot in any place be eaten with less prejudice and more ion than in Egypt."

It is unknown where, precisely, our cultivated onion originated. Some writers ay that no species of the *allium* now found growing wild will produce the table called the onion, even though cultivated ever so carefully. Others rm us that the species with fistular stalks and swelling bulbs, now found in would, if cultivated, produce this vegetable, and firmly assert that it is origi of all the varieties of onion now grown. Some declare that the given to Adam as we now have it, and that it has not degenerated, t degenerate in the least; while others say that if left to itself for a y it would "fall from grace," and become like the wild species de- Be these theories as they may, the wild species of Persia is so nearly to our cultivated onion that some travellers cannot tell the difference.

India onion is highly esteemed for food, and used as an antidote to s, even to a greater extent than in Europe; and most dwellers in own country can remember it as an article of medicine, administered for ful ailments by a skillful mother or maiden aunt.

anc Greeks and Romans cultivated it in large quantities, and at one n armies almost wholly subsisted on it. They also imported m aor in great quantities. The island Cimolus was named Onion t of the peculiar quality and the immense numbers raised there; and that the Roman provinces of Spain, in the days of Scipio the Younger, d annually $200,000 worth of this esculent.

bal, who swore "eternal hate to Rome," and led the Carthaginian through sultry Spain and across the snowy Alps, well knew that the of his army demanded the onion, ever present, amid all the changes of cold. And Aurelian, who led his armies across the burning sands of Palmyra, and leading its queen, Zenobia, captive to Rome, y suffered terribly from scurvy, and was restored to health

* ... from other sources, by A. B. Grosh, of the Department of Agriculture.

only when he found in the captured city well-watered gardens containing abundance of garlic and onions.

So great a quantity of this bulb was raised at the Alibi, in France, that the *tithe* of them is said to have yielded an annual revenue of one thousand crowns for its bishop.

Thus might we glean notice after notice from the pages of history of the high esteem and value accorded this vegetable down to the present day, when Spain, Portugal, and Tripoli yet keep up their ancient reputations for the quantities and qualities of their onions; while in this new world their culture seems everywhere increasing from Canada to Patagonia, and especially in these United States, since our soldiers proved their value in camp, in hospital, and on the march, all through our late civil war. Each one of our brave boys would indorse the statement of its worth made by a late writer, who estimates the amount of nourishing gluten contained in the onion at 25 or 30 per cent., and says: "It is not merely as a *relish*, therefore, that the Spaniard eats his on with his humble crust of bread as he sits by the refreshing spring; it is b experience has long proved that, like the cheese of the English laborer, it to sustain his strength also, and adds (beyond what its bulk would suggest) to the amount of nourishment which his simple meal supplies."

But few will deny the importance of the onion as an article of diet, or in a sanitary point of view. Nor is it without commercial importance. An failure of the onion crop would create considerable panic in the veg market. It is rapidly increasing as an article of export, and will figure in the tables which show "how we feed the nations." It is stated on good authority that in the year 1860 the value of onions exported exceeded the value of exports of apples by more than $250,000. It is also estimated that in 1865 there were planted one-fourth more acres of onions than in any previous year, and that the average product per acre was 500 bushels. And yet the market seems by no means glutted; the appetite "grows with what it fe upon," and, like a certain famous Oliver, asks for "more!" Let us, then, sider the ways and means to meet the demand, and make the supplying profitable.

GOOD SEED.

If compelled to purchase from unknown or unreliable dealers, test the germinating power of the seed before buying. After onion seed is two years old much of it is worthless. The following tests may be of service: 1, new is soft, and has a strong taste; 2, good seed sinks in water; 3, placed on ton, kept soaking wet and in a warm place, good seed will germinate in a days; 4, pour hot water on two sods, place seed between them, and put whole under a stove or other warm position, and it will germinate in a days; and, lastly, (as a test which will also hasten the preparation for and cause an early springing of the crop,) pour boiling water on a m so as to cover it, pouring it off in a few seconds, when, if good, minute like sprouts will start from the heated mass, which may then be mixed plaster or ashes, and immediately planted.

But it is better always to buy your seed from a reliable dealer, even at do price, if necessary, than to get poor or wrong seed as a gift, for the seeds of inferior kind of onions may be fresh and good as mere seed. And it is b all to raise your own seed thus:

Select a sufficient number of smooth, hard, ripe onions, of medium of the kinds you desire. Keep them in a cool, dry place, where they wi freeze, though some planters say that freezing does not injure them. As as the soil can be worked in the spring, set them out in a rich, deeply mellow soil, in rows two feet apart, and the bulbs one foot apart in t Cover them nearly to the stalk, hoe frequently, and keep them free fr

allow more than two stalks of a bulb to bear seed, if you desire
ıvy seed. Tie the stalks to stakes or trellises when they become heavy
ping. When the heads begin to open and the stalks to turn to a straw-
t off the seed heads, and spread them on a loft floor or other warm and
e, until the seed shells out easily—say in four to six weeks. Then
d winnow it clean, and put it away in paper bags, closed with gum or
as to exclude the air, and keep it in a dry place, secure from mice,
ded.

THE GROUND.

oil that can be made mellow, and will grow corn, will produce onions.
be enriched with fine manure, and be deeply stirred, and kept clear of
The best manures are the excrements of fowls and pigs; next, well-
composted stable manure. But in all cases avoid manures containing
weeds and grasses, as they are the great enemies of the crop. Hence
efer liquid manure, and continue to raise onions year after year on the
or field. Apply the manure at the fall ploughing, if possible; if not, in
ıg, after the deep ploughing; spread it and plough it in lightly, and mix it
the soil, which should be thoroughly and finely pulverized, and the
onion bed made as level as possible. Complete the preparation by
up all the clods, and removing the stones, if any, if you would have
benefit of your labors. Some roll the land previous to planting, (and
r spongy soils may be benefited by it,) but it should be done very
as to leave all beneath the mere surface easily to be penetrated by
roots.
soils will be benefited by sowing a few bushels of salt, or many of
both, to the acre, over the surface before planting.

PLANTING.

done by a machine where a large breadth is cultivated. It is unneces-
describe these labor-savers, save to remark that the one most generally
Massachusetts plants two rows at a time, and has small rollers attached
ing down the seed. Those used in Connecticut are said to cost about
s each, and the seed is planted in rows about twelve inches apart,
ut six inches in the row, if the machine plants in hills, which is deemed
an in drills,) and covered with a hand rake, carefully drawn parallel
rows, covering two rows at a time. The seed should be covered about
ach deep, and from five to eight seeds put in a hill, if for home market,
le by the bushel; but ten to twelve seeds to a hill, if designed for a
rket, or bunching on straw. From four to six pounds of seed are
ted to the acre. Plant as early as the condition of the ground will

—South of the State of New York onions are generally cultivated as a
The seed is sown in drills from nine to twelve inches apart, three
an inch in the drill, in beds conveniently wide, and carefully prepared
ring and pulverization for the purpose. The small bulbs thus produced
year are called "sets" in the middle States, and "buttons" further
The second year these "sets" are set out in rows one foot apart, and
ix incl in the row. The "button" held between the fingers and
y pressed into its place, so that it sets firmly in the ground,
u to allow the small fibrous roots to descend into the soil,
t cover the bulb above them. The "sets" should not, then, be dis-
y rooted, and in all after cultivation care should be taken not
Hence all weeding near the bulbs should be performed by

The harvesting of the "buttons" or "sets" the first year, and their cultivation the second year, is the same as for onions cultivated as annuals.

Full-sized onions are sometimes raised from the seed in one year, even in the middle States, by selecting a site that dries off early in the spring, well sheltered from cold winds, and properly exposed to the sun; and then planting very early, so as to secure a large growth before summer's drought and heat stop the circulation of sap in the tops. But frequent failures to attain a full growth induce most persons to prefer the two-years' culture.

HOEING.

As soon as the rows become visible lines of green, go through with a light hoe, and stir the ground between the rows, carefully extirpating every weed When the onions are fairly up, take out the weeds which this first hoeing may have left near and in the rows. To do this well requires great care and frequent use of the fingers. Take in one hand a very light hoe, (the blade about one to two inches wide, and three or four inches long, and the handle a foot or eighteen inches long,) and with the fingers of the other hand ever ready to the grass and weeds, (it would be dangerous to cut with the hoe,) *on your* apply yourself to the task. A handy, willing boy will do this work b faster than a man.

The wheel-hoe is a valuable implement for field culture, to cut up the weeds between the rows. But weeding *in* the rows, and around the bulbs, must be done by the small hand-hoe and the fingers, at least until some ingenious Yankee invents a machine capable of discerning onions from weeds.

From the first appearance of the tops, until the bulbs are as large as p eggs, the ground should be frequently hoed to keep it mellow, and every w be carefully cut up or rooted out to give the onions the sole occupancy of the soil and the full benefit of the culture. But when the bulbs attain that size, hoe should be laid aside, at least not be allowed near the finest root, and fi weeding only be used to keep the crop *perfectly* free from weeds.

DISEASES, ETC.

The most common disease is *smut* or *blight*. It shows its presence by tur the tops to a straw-color, when, on examination, the inside of the leaves will found smutty or black. In some cases the stalk cracks open; but at c times it takes the same form as in wheat or other cereals. This disease is common in old fields than in new. The causes are imperfectly known, and n effectual remedy has yet been found. Probably a sprinkling of sulphur w be beneficial.

If onions show a disposition to "grow too much to top," or to form seed bu bend down the tops, giving them a twist at the same time that shall bruise th but be careful not to break them off.

If the plants persistently run to thick necks, or "scallions," pull them up soon as of sufficient size for marketing or home use, and thus give the o more room.

THE ONION FLY—(*Anthomyia Ceparum.*)

Soon after the plants come up a small greenish white fly, about half t of the common house fly, with very transparent wings of rainbow hu tures the young stalks near the ground, and deposits from one to six closing the wound with wax, which the insect secretes. In from one w twelve days (according to the weather) the eggs are hatched, and the gnaw their way out and go down into the little bulb. Here they r enough to destroy the plant, when they emigrate to another for a fr

ıey generally finish the work of destruction about the beginning of July. ıey do not always confine their work to the young plants, but attack ad- ed bulbs and the seed onion. When the maggots have attained the age of : or eight weeks, they bury themselves in the ground, roll themselves up like e chrysalis of the canker worm, and remain through the winter. In the ıg, after the ground is sufficiently warm, they emerge from their resting : as perfect insects.

PREVENTIVES AND REMEDIES.

Spare the birds! I *know* that they destroy a vast number of the flies and ggots. Especially does the robin (*Turdus migratorius*) and the chip- sparrow (*Spizella socialis*) devour an innumerable quantity of them. And e seen the white-bellied swallow (*Hirundo bicolor*) flying within a few of the onions during the season when the fly was busy laying her eggs. s swallow feeds mostly on the wing, there can be no doubt that it devours of this pest. The common yellow bird (*Dendroica æstiva*) will eat several ts weight of insects every week, and I have seen them busy for hours in n on an onion bed picking away at the flies and maggots. Other pre- ıves and remedies commonly used with success are the following:

1. Soak the seed in water a little above blood heat for half an hour to hatch ı ggot; then in a strong solution of copperas or saltpetre to kill those r ı; and finish by rolling the seed in dry air-slaked lime, and sow it.
2. Soak the seed for 24 hours in chamber lye, (urine,) or in brine made as ; as possible, then roll in ashes and sow.
3. x every pound of seed with half a pound of sulphur, and sow them er.
4. The dust from coal pits and forges, (mixed with ashes, if the ground is a heavy clay,) well spread and lightly ploughed or cultivated in before ıg.
5. Sow soot, or charcoal dust, or common salt, thickly over three-fourths or ifths of the rows at planting, (leaving the other rows as "cities of refuge;") w the application as soon as the onions are well up; and *again* (say) about idle of June.
6. As soon as the plants appear, (and again, at intervals of from a week to lays, until the middle of June,) sprinkle dry, unleached ashes on (and not r around) the plants while they are wet with rain or dew. Some water nts, and then sprinkle.
7. Others prefer a mixture of equal parts of charcoal dust, (or soot,) air-slaked ashes, and plaster, applied while the onions are wet.
8. Cover the ground around the plants with fresh pine sawdust, and when plants are about four inches high, wet the sawdust with gas water, diluted twice its bulk of soft water.
9. Where gas water cannot be had, some substitute a strong decoction of to-
10. Great success has attended the pouring of boiling water from a tea-kettle along the drills, close to the bulbs. There is no danger in this, as a living ble will resist a brief heat sufficient to destroy the tender cold-blooded

THE CUT-WORM—(*Agrotis.*)

very destructive. It belongs to the same family as the v ı s off the stalk just above the ground. It generally works t, ı at daybreak covers itself with earth, which it resembles so ıı difficult to discover it. It is about an inch long when

As with the maggots, so with the cut-worm; the same general appl cause him to "change his base;" but the principal remedy is, "spare th They are "up in the morning early," before the worms retire for the d "the early bird catches the worm." How beneficial, then, are these "c of the upper deep" to the onion grower! They are diligent in providin and hourly food "from early dawn to dewy eve;" and if they do se their worms and flies with an occasional cherry or strawberry, it is f health, and really leaves us in their debt on the whole account.

Having kept down the weeds throughout the season, and, with the the birds, done what we could to lessen the scourge of the insects, t event in order is

THE HARVEST.

When the tops turn yellow or brown and fall over, the onions are harvesting. (The "scallions" or thick-necked plants, with others not n can be passed by for later disposal.) Pull, hoe, or rake out the bulbs ca so as not to wound or bruise them, and expose the bottoms or roots to as much as possible. Leave them to dry, turning them once or twice t perfect drying. If you desire to secure them in their greatest beauty, few days stack them, about a barrel to a heap, for sweating. After re in heaps about two weeks, open the stack, spread it, and dry again fo three bright sunny days. They are then ready for marketing or stori intended for early marketing, cut the tops off about an inch above the b pack in barrels. If they are to be put in ropes, or bunched, cut off t about three inches above; but if they are to be stored, leave the tops an husks (to absorb any moisture caused by after-heating and sweating ready to market them. A sheep-shears will be found a good instrum topping them. For storing, they should be perfectly dry and free fro The loft, store-room, or cellar, should be of even temperature, cool, d airy. Spread them out in bins or on floors, not over a foot deep, unless ting an open floor of slats under them, elevated a few inches above t floor, you provide for a free circulation of air under, up, through, and sides of the pile. In such case they may be spread three, four, or e feet deep. Watch diligently, however, and carefully keep them from h and should they heat, or gather moisture, open the heap immediately and cool them. If liable to freeze at the approach of cold weather, cov well with hay, straw, carpeting, &c., at top and sides, so that if they do they may remain undisturbed and free from thawing until spring, a thaw them gradually, as thus the freezing will not injure them. See fore, that the coverings at the sides and on top are not removed unti thawed out.

The "scallions" and later gathering should be kept by themselves, a keted early.

VARIETIES.

These are numerous, but a few only of the best and most approved ki be described:

Weathersfield—the most prolific and most commonly cultivated—is red variety, from which three sub-varieties have been produced by car long-continued culture—the first Early and the second Early d from three weeks to a fortnight earlier than the Late Red, and s r t size. The Large Late Red sometimes grows to six inches in hardier than the earlier reds. Some cultivators suppose that t ties are wholly determined by the shape of the bulbs employed i raisi t flat producing the late, and the rounder bulbs producing t

Early Red Globe—a very fine and delicate onion—much sought after, and esteemed by epicures.

ıne red varieties are generally better growers and keepers than the white and r, but do not sell as readily, nor bring as high a price in the markets.

Ine Yellow Danvers—round, solid, a good keeper, and the next in produc- if not the equal of the Weathersfield. It ripens about the beginning of nber; is very compact and heavy, weighing more per bushel than any r; is more uniform in shape and size, and will yield "a greater proportion nandsome, well-developed seed onions" than any other, according to Mr. egory, of Marblehead, Massachusetts.

The Early Cracker—so called from its resemblance to the water-cracker—a yellow onion, is thin, compact, honey-color, "in fineness of structure and cacy of flavor is unsurpassed," and accordingly commands a higher price other early sorts. It bruises easily, and, therefore, requires careful hand- Its diameter varies from two to three inches, and its thickness is about nch from neck to root.

ıite Portugal or *Silver Skin*—an early variety, frequently planted for ." It is rather a poor keeper, but has a mild, sweet, delicious flavor. It principal variety grown in Buenos Ayres, where it grows much larger ı e.

ıne Potato onion grows from bulbs planted deep in the ground, the planted growing to a large size, and producing from five to seven small bulbs it for next year's planting. It is the earliest of the onion tribe, being fit table several weeks earlier than any grown from seed. And as it is d deeper in the earth than common "sets" or "buttons," it may be put in e in the fall, (as it is easier to shelter from freezing by extra covering than common onion,) so as to start at the first warmth of spring. The potato ı is mild in flavor, hard in flesh, and the small bulbs excellent for pickling. s a poor keeper. Plant in rows 18 inches apart, and the bulbs from 6 to 8 a t in the row. The planted bulb will grow to about three inches in

ınere is no doubt that the potato onion originated in some freak of the com- kinds, as frequently a seed will produce several little onions instead of a one; and sometimes a potato onion will send up a large single shoot and to head, but seldom produces seed.

The Tree or *Top onion* produces sets instead of seed, like the garlic; but it eemed except for pickles, and seldom grown. Planted and cultivated common onion when the latter is set out for seed.

Uı ıne above kinds, the Weathersfield large red is the most prolific, in some over 900 bushels having been produced to the acre. Next, if not equal ı ın productiveness, is the Yellow Danvers. In pecuniary profit the two are ably equal, except in particular localities, where market preferences may e a difference.

ıhe Department of Agriculture has imported and distributed widely seeds of eral approved foreign varieties, which it is hoped may prove valuable acces- ıs w n properly cultivated and duly acclimated. Among these we will following, copying the descriptions given of them from Thompson's Gan 's Assistant," a valuable and costly British work.

W : *Spanish* or *White Portugal*.—"Very large, flat; skin loose, pale ling off spontaneously, exhibiting the next coating, which i greenish or y mild. This sort is not a long keeper, bu is much quaııty, and is one of the best for early winter use."

ıaı r *White Florence*.—"Large, globular, neck rather thick; the cl and white. A late, but hardy sort."

ch.—"Large, varying in shape from flat to glo- m, of firm texture; divested of this the color

is reddish brown tinged with green; flavor strong. Being a hardy sort and a good keeper, it is very generally cultivated."

White Globe.—"A sub-variety of the Strasburg, much approved of by the growers near London. It is rather large and firm; general form roundish, bu inclining to taper abruptly towards the neck, and also to the root, which is an advantage, as the hard portion in connexion with the root is somewhat prominent, and can be cut off without entering deeply into the softer substance of the bulb. It is of excellent quality, and a good keeper."

French, or *Dutch Blood Red.*—"Middle-sized or large, rather flattish; skin dull red, the coating next below it glossy, and very dark red. The interna layers are palest at the base, and, except at the top, they are only colored on their outsides; each layer is paler than the one that surrounds it till the centr is reached, which is white. Of all others this is the strongest flavored; it keep remarkably well."

Tripoli or *Besagnina.*—"Very large, tapering sometimes abruptly fr middle to the neck, and almost equally so to the root; color light reddi brown beneath the skin pale brownish red tinged with green. It is of a soft nature and does not keep long, but while it lasts it is much esteemed on account of it mild quality."

Welsh or *Cyboule.*—"This is the *Allium fistulosum*, L., an herbaceous perennial, a native of Siberia, and consequently very hardy. The French hav two varieties—the white and the red. It is quite distinct from the commo onion, inasmuch as it never forms a bulb; its roots are long and tapering, wit strong fibres, and its stems and leaves are hollow. Its principal use is for sow ing in the end of July or beginning of August, to furnish young onions for se early in the spring. Being very hardy, some of it should be grown for a suppl in case the common onion should be cut off by a severe winter."

COST AND PROFIT OF A CROP.

Both depend, of course, on many circumstances—kind of culture, prices of materials, labor, onions, &c. But that the inexperienced may forn some estimate of probabilities the prominent items of expense per acre ar named: 1st, interest on value of land; 2d, twenty loads of manure; 3d, h ing, spreading, and ploughing, or cultivating in the same, so as to mix thoroughly with the soil; 4th, fall and spring ploughing and harrowing; 5th raking off clods and stones, and levelling the ground for planting; 6th, bushels of ashes, or their equivalent in lime, plaster, or other fertilizers an remedies; 7th, four to six pounds of seed; 8th, planting; 9th, hoeing not les than four or five times—say six days; 10th, weeding not less than four or fiv times—say thirty days of boy labor; 11th, pulling and piling ten to twelve days 12th, topping, drawing home with team, and putting up crop for market. total of these expenses in Connecticut and Massachusetts (where the probably greatest) would be covered by from $130 to $150. The market pric of onions in the large cities, at the proper selling season, rarely is less than cents per bushel, or more than $2. Estimating an average yield to be bushels, it will readily be seen that with but moderate care and success raising is a *paying* crop, and in some sections may be made a *profitable*

MISCELLANEOUS.

The new beginner should remember that *skill* is only acquired by *exper* combined with persistent industry, close observation, and all the knov can obtain from others. A beginning should, therefore, be made on a m scale. The second requisite is a deeply-cultivated, rich, friable from weeds as possible. The third is good and abundant ur is good seed of the best kinds of onions. And the fifth

as important as any) is, never allow the weeds to get the start of you. The land also should be as nearly level as possible, and fully exposed to the sun.

Guano, superphosphates, and bone-dust or bone-flour, are all recommended for special manures to stimulate the growth, and the first named to keep off the fly; and where manure of hogs or fowls is scarce or dear, they answer an excellent purpose. The mixture of soot, fresh air-slaked lime, plaster, charcoal dust, ashes, salt, (omitting the last two if the land is heavy clay or too wet,) will be found a good preventive, and a stimulant also, and is highly recommended for the latter purpose. They should always be sowed when the plants are wet. If the soil is very sandy, and has been well limed, the lime may be omitted.

Some tramp the soil around the bulbs, or run a very light roller (or a barrel) over the rows, when the plants show no disposition to "bottom" or form bulbs. The effect is the same as in bending down and twisting the tops, as already mentioned.

Earlier crops can be secured of this plant, as of others, by careful selection of the finest early ripening onions, and of the earliest ripening seed from them. But some growers deem it necessary to "change seed" frequently; in which case, correspondents should be selected who can be relied on to pursue the same measures for improvement, with whom to exchange seed. A free exchange of "experience," to accompany exchanges of seed, will add to the profits of both parties.

And in this, as in the culture of all other products, the grower must enrich his soil not only with "the sweat of his brow," but with the best use of his brains, if he would attain the greatest success in his vocation.

RKET GARDENING IN THE VICINITY OF NEW YORK.

BY PETER HENDERSON, SOUTH BERGEN, NEW JERSEY.

To supply a population of a million inhabitants daily, throughout the year, fresh vegetables would, it might be supposed, require an immense tract of Such, however, is not the case. I doubt if there are more than 4,000 levoted to the raising of green vegetables, three-fourths of that extent occupied with the bulkier articles of corn, peas, and beans. The finer ops of early vegetables—such as asparagus, beet, cabbage, cauliflower, cucumr, lettuce, onion, radish, rhubarb, tomato, and turnip—being confined to an of possibly not more than 1,000 acres. This area is occupied by the gardeners in portions of from five to fifty acres, the average being about es to each. I will briefly detail our manner of cultivating the above as acuced in this vicinity, premising that, for the cultivation of all kinds of vegables for profit, the soil should be of the best quality—loam of at least ten ches deep, with a porous subsoil.

Asparagus being a crop that will produce for twenty years without renewal, preparation is given to the bed in which it is planted. This is done by ly pulverizing the soil, trenching it two feet deep, incorporating it out with at least six inches of well-rotted manure. When thus prehe beds are lined out six feet wide, four rows being planted in each bed, t the convenience of the planter. The plants are set nine ue We usually take a full crop the second year after

planting. The market value of asparagus is much varied, ranging from $500 to $1,000 per acre. But when once planted, it is profitable even at the minimum rate, as there is no expense attending it, except giving it a top-dressing of manure each fall, which is dug in in the spring, and in keeping the crop clear of weeds.

The *beet* used for the first crop is the "bassano," which is followed by the "short-top round." These are sown about the first week in April, in rows eighteen inches apart, and are thinned out, as soon as they get about an inch high, to five or six inches apart, and thoroughly hoed with the prong hoe twice, or until the leaves cover the soil. This crop is marketable with this treatment about the middle of June, and is sold clear off in two or three weeks at a price varying from $400 to $800 per acre. This, it will be understood, is a *first* crop, to be followed by celery or other vegetables as a *second* crop, as will be described hereafter.

Early cabbage or *cauliflower* are our most profitable, and hence most important, of all crops. The seed for these (for their culture is the same in all respects) is sown in the open ground from the 15th to the 20th of September, and a month later the plants are planted out in "cold frames," at a distance of about two to three inches apart. These frames are covered with sashes as the cold weather advances; not usually, however, before the middle of November. Care must be taken to expose them to the air on all occasions in mild days all throughout the winter. We plant them out where they are to head, usually from the middle to the end of March, in rows two feet apart, by sixteen inches between the plants. Between the rows of cabbage or cauliflower we plant lettuce plants, which have been sown and wintered over in the same manner as the plants of cauliflower and cabbage. The lettuce is ready for market by the middle of May, and is cut out and sold before the plants of cabbage or cauliflower have grown to injure it. Thus two crops grow on the same ground at the same time. The crop of cabbage and cauliflower is sold from the middle of June until the middle of July, never later. This, also, is succeeded by the second or fall crop. The value of this double crop is rarely less than $650: thus, 15,000 lettuce at $10 per 1,000 is $150, and 12,000 cabbage at $50 per 1,000 is $500=$650.

This may be taken as a low average, for, by extra manuring and cultivation, it is not at all unusual to double these amounts.

Cauliflower commands a much higher price than cabbage, usually $25 per one hundred, but the crop is by no means so certain, as we rarely make good crops two years in succession. The variety of cabbage used is the early Wakefield exclusively. It somewhat resembles the Winnigstadt, but is at least two weeks earlier. The varieties of cauliflower, are the dwarf Erfurt and Early Paris.

Onions are raised from "sets" or small bulbs that have been grown from seed sown thickly the previous year on very poor soil, so as to render them as small as possible. These are planted out as early as the ground is fit to work in spring, in beds, rows nine inches apart, the sets two inches apart in the rows. Great care is required in this crop to have the ground hoed, just as soon as the onions start to grow, and to have the soil broken between the plants with the fingers, so as to destroy the embryo weeds before they start, as the crop may be stifled if the weeds get headway.

The amount sold per acre has always been with me greater than any other, although requiring more labor to produce it. It has never sold for less than $500 per acre, and on one occasion as high as $2,100. The onions are sold in bunches (of eight or ten in each) in the green state. If dried they come in competition with those raised from the seed, and thus do not sell at anything like so high a rate. This, also, is a first crop, cleared off in July, and followed by y, &c., as second crops.

Early radishes—the first of all vegetables from the open ground—are of ry simple culture. The ground being thoroughly pulverized by ploughing id harrowing, the seed is sown regularly "broadcast," then lightly run over ;ain with the harrow, which completes the labor until the crop is fit to gather, ually by the middle of May, or in six weeks after sowing. But although the or of preparing the ground is very little, the preparation of the radishes for arket is very expensive, all requiring to be tied in bunches, and cleanly washed efore they can be sold. The prices in the New York market average about 10 per 1,000 bunches. An experienced tier averages only about that number er day; another hand is required to gather, and still another to wash. So it rill be seen that the great labor in this crop leaves but a small margin of profit; he gross receipts not being more than $300 per acre. The radish crop is usually ceeded by carrots, parsnips, or long blood beets for winter use.

Rhubarb, like asparagus, being a perennial plant, requires special preparation of the soil to produce profitable crops. The variety we find most profitable is the Victoria, though by no means so high flavored as the Linnæus; but the quality of vegetables, as regards flavor, seems to be of only secondary importance in a large market like that of New York; size being everything in an article like rhubarb. It is increased by division of the roots, planted in rows four feet apart by two and a half or three feet between the plants, and is fit to be gathered the second year after planting. The preparation of the soil is similar to that used for asparagus beds, copious dressings of well-rotted manure should be dug in close around the roots in early spring. It is a clean, convenient, and safe crop, averaging a sale of $600 per acre.

The tomato is a vegetable requiring a peculiar soil and location to be produced early. I have often seen a difference of two weeks in the ripening of this fruit from the same sized plants, planted the same day, in situations only half a mile apart, but on entirely different soils; those on the light sandy soil, selling, by their earliness, at $4 per bushel; those on the stiff clayey soil, two weeks later, a drug at one-fourth of that price. The tomato, in a country like ours, will only be profitable in warm, southerly portions of the country, where there are rapid facilities to get them to the northern markets.

Thus the crop raised in the vicinity of Baltimore will always be supplanted by that, at least ten days earlier, raised in the vicinity of Norfolk. The Baltimore crop again, in turn, supplanting that of New York. It would be difficult to determine the value of the tomato crop per acre, owing to its condition of earliness and productiveness being so varied. I have discontinued growing it for some years, being convinced that it was far from profitable in this section, although there is no doubt that, in warmer latitudes, within transporting distance (say sixty hours) of our large cities, it must be highly so.

Turnip.—"Early purple top strap-leaved" is the variety most valued for market here. Its cultivation and returns are very similar to that of early turnip or Bassano beet, already described. The ground is usually cleared of this crop by the middle of June, enabling it to be followed by a second crop of sweet corn, bush beans, or celery, as may be desired. These varieties are the leading sorts that are used as a first crop. Our second consists of spinach, horseradish, celery, thyme, and other sweet herbs.

Spinach.—The only variety we use is the winter or prickly, sown from the 1st to the 15th of September, in rows one foot apart, hoed and kept clear of weeds until the growth ceases in the fall. It is best preserved during winter by a coating of two or three inches of straw or salt meadow hay. It begins to be sold often as early as March, and is usually cut off entirely in time to be followed by a summer crop of cabbage, onion, or beet. It usually sells for about $500 per acre, but it is only a moderately profitable crop, as it entails great expense in the labor of picking and preparing for market.

Horseradish.—The culture is very simple, and, so far, very profitable.

The plants or sets used are the pieces broken off from the main root in its preparation for market. These are cut into lengths of about six inches long, and are from one-quarter to half an inch in diameter. They are planted *between the rows* of cabbage or cauliflower as soon as these crops are planted in the spring, and about the same distance apart between the plants. The set or root is planted perpendicularly three inches under the surface. There is no danger in planting the sets thus deep, for horseradish is particularly tenacious of life, and will start and push through the soil even if planted much deeper. The motive in planting it under the surface is to delay its starting, so as not to interfere with the cabbage crop, which may close over it without any injury whatever to the horseradish. It sometimes happens, however, either from planting too near the surface, or by the sets being very strong, that the horseradish grows so strongly as to seriously interfere with the cabbage crop. In such cases it must be cut off by the hoe, and this will not injure it in the slightest degree. We have often had to hoe it off twice before the cabbage crop was ready. It will be borne in mind that it is the root only of this crop that is wanted, and that being grown mostly in the late summer and fall months, the removal of the leaves in June, or July even, does not in any way affect the crop.

As soon as the cabbages have been cut off, the stumps are dug up and the ground deeply hoed so as to encourage the growth of the horseradish crop. This rarely requires to be done more than once, the rapid growth of the leaves smothering all weeds. It attains its full growth of root by the end of October, when it may be dug up; but being an entirely hardy plant, we usually defer lifting it until all our more tender vegetables are secured, so that the time of digging it up is usually in November and December. It is then placed in pits adjacent to the vegetable-house, so that it can be got at conveniently and trimmed during leisure time in winter. Its preparation for market is very simple, being merely trimming off the small roots, (which are kept for next season's planting;) washing, by rinsing them around in a large tub; weighing—for it is all sold by weight—and packing in barrels. The average weight per acre is four tons, and for the past five years it has sold at $200 per ton, or $800 per acre. During March of last year it sold as high as $250 per ton. I have always considered it as the most safe and profitable crop of our gardens.

Celery.—As the cultivation of celery is but very indifferently understood, and an immense amount of useless labor given to its cultivation in many parts of the country, I will describe our practice of it at more length than other vegetables. This system is suitable either for private use or for market garden culture.

The ground best suited for celery is a heavy loam, although it will grow freely on any soil, provided it is rich enough. It is a mistaken notion that it does best on wet soil. No doubt it requires abundance of moisture; but at the same time it is quite as impatient of a soil where water stagnates as any vegetable we grow.

The system we now adopt is much more simple than that in general use. We entirely dispense with the trenches, thereby saving a great deal of extra labor. The crop is planted on the flat surface, in the same manner as any other vegetable, in rows (for the dwarf varieties) three feet apart, by six inches between the plants. In planting, great care should be taken that the roots are properly formed. The safest plan, after planting, is to press by the side of each plant gently with the foot, so as to compact the earth around the root until the new rootlets are formed. This practice should be rigidly observed in planting of every description, as much disappointment is caused by the omission of this very simple precaution.

After planting, nothing more is required for six or seven weeks but hoeing between the rows to keep down the weeds. By the end of August the cool and moist atmosphere quickly induces a rapid growth, and when the plants attain the height of ten or twelve inches the earth may be drawn up against them, so

to e an upright growth and keep the plants from spreading. To that fall use, a further addition of soil may be added. This time it had be done by the spade, and raised to at least half the height of the plants. e n l earthing-up may be delayed for a few days, so as to allow an increase growth. In two or three weeks after the last earthing-up, it will be blanched y for use. This is the process required for what is to be used until e aie of December. That which is wanted for *late* winter use requires ttle labor, as it should never be banked up. All that is required is simply hoe the soil towards it, so as to induce an upright growth; then further en the soil to it with the hands, and hoe up against it soil enough to keep plant in its upright position, which is all that is necessary until it is dug up be put away in the trenches, wherein it is to be kept during winter. This performed in the following manner: Dig a trench or drain in a dry spot narrow as the spade will allow, say ten or twelve inches wide, and of the depth the length of the celery—that is, if the celery is two feet long, the trench must two feet deep, so that the top leaves will be level with the surface of the ground. will be understood that the celery is packed in this trench or drain perpendicu-rly, so as to fill it completely; no earth being put between the plants, nor even to oots, as there is always moisture enough at the bottom of the trench to keep e plants from wilting. The time at which this operation is performed has a great to do with its success. In growing this crop on a large scale in our market ns, we begin to put the first lot away in the trenches by the 25th of Octo-r, which is blanched fit for use by the middle of December. Our second lot away about the 10th of November, which is that used in January and iary. The last lot we delay putting away as long as it is safe to risk it— y 20th of November. This lot almost invariably keeps in fine order until Attention to dates in this matter is of the utmost importance, as by g it away too early the warm weather would cause it to blanch too ly, while by delaying too long it might get caught by frost, which usually severe enough to hurt it by the end of November. By the middle of er the trenches containing the celery must begin to be covered up with w or leaves, which must overlap the trench a foot at least on each side. The eri must be done at intervals as the season advances to severe weather, is rarely before the first of January. By this time it should have a cov-of it or ten inches. Covered to this depth it will safely resist the v sts, and the roots can be taken out with little trouble during the i .

For private use.—Where there is a plenty of cellar-room the celery may be ed in narrow boxes, having a layer of soil at the bottom, exactly in the same r as is done in the trench. The only precaution necessary is, that the be narrow, so that too much of it may not be packed together to heat.

The *dwarf* varieties, red and white, should be grown to the exclusion of all They are much better flavored, more solid, take up only two-thirds of e ce, cost only half as much in labor, and, above all, being of firmer tex-re, they keep much better during the winter. We have grown over ten acres se eties for the last six years, and have found it vastly to our interest d others.

By g the new dwarf variety, we grow, for fall use, 30,000 roots per acre— rs e feet apart—which have averaged, even in the New York markets, $3 r ed roots. For winter use, 40,000 roots per acre are planted—rows e —which averages $2 per hundred roots. There is considerable n grow this crop, and, occasionally, loss from peculiarities of the season; a in quantity grown and thrown into our market (for it is not easily se) lowers the price, at some parts of the season, below the paying r or the past few years, however, our market here has been relieved by to Philadelphia, Baltimore, Boston, and other cities. There is no

doubt that, in many parts of the Union, it can be grown by our method at a handsome profit.

Sweet herbs.—The cultivation of *thyme, sage, &c.*, for market purposes is but little known in this country except in the vegetable gardens in the vicinity of New York. There it is practiced to an extent of perhaps sixty or seventy acres, a fair average product of which would be about $500 per acre. Like the crops of celery, spinach, or horseradish, it is grown only as a second crop—that is, it is planted in July after an early crop of peas, cabbages, beets, or onions has been sold off. The varieties used are thyme, sage, summer savory, and sweet marjoram, the former two being grown in the ratio of ten acres to one of the latter. The seed is sown in April in rich mellow soil, carefully kept clean from weeds until the plants are fit to plant out, which may be done any time that the ground is ready, from the middle of June until the end of July. As the plants are usually small and delicate, it is necessary that the ground be well fined down by harrowing and raking before planting. The distance apart, for all the varieties, is about the same, namely, twelve inches between the rows, and eight or ten inches between the plants. The lines are marked out by what is termed a "marker," which is simply a mammoth wooden rake with the teeth twelve inches from centres; having six or eight teeth, this number of lines is marked at once. This "marker" is used for many other purposes; in lining out the rows for early cabbages, for instance, every alternate line is planted, thus leaving them two feet apart, their proper distance.

In eight or ten days after the herb crop has been planted, the ground is "hoed" lightly over by a steel rake, which disturbs the surface sufficiently to destroy the crop of weeds that are just beginning to germinate; it is done in one-third of the time that it could be done with a hoe, and answers the purpose quite as well; as deep hoeing, at this early stage of planting, is perfectly useless. In ten or twelve days more the same operation is repeated with the steel rake, which usually effectually destroys all weeds, the seeds of which are near enough the surface of the ground to germinate. (We use the steel rake instead of a hoe on all our crops immediately after planting; for, as before said, deep hoeing on plants of any kind, *when newly planted*, is quite unnecessary; and by the steady application of this rake weeds are easily kept down, and it is great economy of labor *never to allow them to get established.*)

The herb crop usually covers the ground completely by the middle of September. Then every alternate line is cut out, each plant making about two "bunches." The object in cutting out the lines alternately is to give room for the remaining lines to grow. In this way, nearly twice as much is taken off the ground as if every line had been cut; and it frequently happens, on particularly rich soils, that at a second cutting every alternate line is *again* taken, when the remaining lines, now standing about four feet apart, will again meet. I had about an acre of thyme treated by this process, in the fall of 1864, that sold for over $2,000. But this was an exceptional case; the crop was unusually heavy, and prices, at that time, were more than double the average. As before stated, the average yield is about $500 per acre. Herbs are always a safe crop for the market gardener. They are less perishable than anything else grown; for, if there be any interruption to their sale in a green state, they can be dried, boxed, or barreled up, and sold in a dry state a year after if necessary. The usual price is from $10 to $15 per 1,000 bunches, and we have always preferred to dry rather than sell for less than $10 per 1,000—experience telling us that the market will always so regulate itself as to handsomely pay for holding back the sale. The cost of getting the crop raised and marketed will average about $150 per acre, the principal expense being in tying it in bunches. But with many of our industrious German gardeners it does not cost half that, as the tying is usually done by their wives and children in the evenings, and is a pleasant as well as profitable occupation.

It may be supposed by some that these large receipts per acre, from market irdening, are exaggerations. I can simply say, they are not. The condition the soil, howev r, in which our vegetables are grown, is such as few farmers ive any conception of. One leading condition of this high state of cultivation where required) thorough drainage; most of my land is drained with four-horseshoe tile, three feet deep, the drains being only eighteen feet apart. use, every spring, at least seventy-five tons of well rotted manure per or alternate it with 1,200 pounds of best Peruvian guano, or 2,000 pounds c ied bone. The manuring is done only in the spring for the first crop; ent remains in the soil to carry through the second crop of celery, &c., sfully.

It takes about three years to bring ordinary farm land into the high state of ivation necessary for successful market gardening.

MARKET PRODUCTS OF WEST NEW JERSEY.

BY J. S. LIPPINCOTT, HADDONFIELD, N. J.

LABOR, either of muscle or of mind, is the true source of wealth. It is not the gains of trade, or successful speculation, that the resources of a nation eased; but by the harmonious, unimpeded labor of every member in ou ss for which he is fitted, and the equitable interchange of the products d skill, of inventive genius, and of mental toil. Mental labor is pro-ny luded among the sources of national wealth, because, though often e i "unproductive," it is the agency by which unskilled labor is directed t and rendered valuable. The moral and intellectual growth of a people also a source of wealth, adding to material gains, while it increases the ability derive legitimate pleasure from the possession of abundance.

The foundations of our national wealth are laid upon agriculture, manufac-, commerce, and mining. Of these, agriculture is of first importance. It which feeds and clothes all other labor, which supplies the material to be d by the skill of the artist, and freights our commerce, foreign and c. Agricultural labor is, then, the leading and most important direct of wealth. The skill of the mechanic may improve, the enterprise of the rcnant may exchange, but the source of wealth is in the earth, and the cost d pr ; are alike determined by the results of agriculture. No other branch n industry has stronger claims upon the fostering care of legislation; not only upon its prosperity does that of the State now depend, but the of the nation is closely bound up with its healthy and sustained progress. he conservation, by the present generation, of those forces in the soil to ich we owe our wealth of vegetable and animal products—upon our ability , without deterioration, to produce material for food and clothing it for the growing wants of a rapidly increasing people, depends, in a asure, the future of the nation. What question of material interests is ito or demands more earnest consideration, by those who would for t living as well as for their posterity?

to t sperity of agriculture we owe most of the increase in wealth, and civilization and refinement of the present age. This is so obvious, al sta are considered by every statesman as a thermometer, gly, the advance or decline of a nation's prosperity.

Hence the care taken to register these statistics by those States in which the true principles that regulate trade and productive industry are best understood. Monetary crises have originated and spread rather from ignorance of the actual state of productive industry throughout the earth than from any other cause. The value of agricultural statistics can hardly be overestimated. They form, as has been well said, "the key which is to unlock the hidden treasures of maturing nature; the chart which reveals to the husbandman and merchant the great laws of demand and supply, enabling each to work out a safe and healthy prosperity."

Though the following is mainly descriptive of the progress and products, with extended notices, of the market-gardening of Camden county, the region with which we are most familiar, the character of the agriculture of the western and southern counties of New Jersey, is therein approximately described.

All that the county of Camden (and a wide district of New Jersey) claims in superiority over the primeval forest, has been the result of unremitting labor and the teachings of recent times. Nature supplied but the crude materials of sands, and clay, and muck; the industrious and skillful farmer has wrought out the problem of existence by aid of foreign material which the neighboring city and the exhaustless "marl" beds have supplied. The soil of the district does not appear to possess the self-recuperative powers enjoyed by many regions whose loams have resulted from the decomposition of hornblende and limestone rocks. These latter, by their decay, give up to the softened material which man, by his labors and the growth of vegetation, converts into soil, a larger share of those soluble mineral ingredients which, though needful to the successful production of human food, are not largely present in the soil of lower New Jersey. Nowhere can more convincing evidence of the immense superiority of the recent improved system of farming, over that pursued by the fathers and grandfathers of the present generation, be found, than in this section of the Union. The success already attained should stimulate to renewed efforts; for it is by no means certain that the limit of improvement has been reached. A very large portion of the eastern counties of New Jersey is, moreover, in a state of nature—wild land, scarcely inferior to much of that which the energy of the West New Jersey farmer has redeemed. The same means, so successful in his hands, must render productive these now unproductive tracts; and it is a leading object of this paper to exhibit the gratifying results of thorough improved culture upon exhausted soils, that the example may be imitated by the despairing or doubting tenant of similar lands yet unimproved. In the midst of the wilderness of East New Jersey, some enterprising agriculturists have already made farms which would be pronounced models in any part of the country, and the cultivation of small fruits and garden vegetables has there been extensively and successfully prosecuted. The low swamp-lands, hitherto esteemed valuable only for their product of white cedar or cypress, (*Cypressus thyoides*,) the common material for fence rails, are also found capable of redemption, and, when planted with the cranberry, have proved highly remunerative. Capital and labor are now tending largely towards this branch of cultivation.

The success which has attended sundry attempts to redeem this hitherto neglected part of the Union has been so gratifying, that it bids fair to turn the tide of emigration. Many, dissatisfied with the border semi-civilization of the west, and its privations, its extreme climate, and their general unsatisfactory experience, have returned to the east, to find in New Jersey all the advantages of a kind soil, (needing much improvement, it is true, but with fertilizing resources of ready access,) near an unsurpassed market, with a climate uneq[illegible] for mildness and salubrity anywhere in the north. To those who cont[illegible] removal from the northeast or the northwest in search of a more genial air—[illegible] all who would learn what gratifying results may be attained on a se[illegible] unpropitious soil, this record of the experience of the New Jersey farmer

ove interesting. Its lessons may be read with advantage by farmers, in the east or in the west, whether contemplating removal, or content to n their paternal acres depleted by the generations that have grown n.

THE "PEA-SHORE" REGION.

roduction of vegetables for the markets of Philadelphia and New York ing branch of New Jersey agriculture. The business is locally de- ed "trucking," and those who pursue it, "truck farmers" or "truck men." erms, though not found in "Webster unabridged," are of long-standing t whence their origin we have not discovered. "To truck" is an obsolete r vulgar term for bartering, but for that kind of trade common between y settlers and the Indians, by which articles of trifling cost were ex- l for others of greater value—as trinkets, for skins and furs. As the arden-truck" is often used by farmers who regard the cultivation of the contemptible, the word may have had kindred origin with that which s the barter of trifles for valuable commodities. The comparison may ear to hold good; for, from a moderate extent of well-tilled land, the and early producer of market-garden vegetables, or "truck," receives turns in substantial sums of gold or greenbacks.

eculiar advantages, local and general, enjoyed by the eastern bank of aware river to furnish to the epicurean tables of the adjoining city those , early vegetables, unsurpassed in quality in any other region, as well heavy supplies of more common produce indispensable to the health fort of the masses, render this district peculiarly worthy of notice. The vored portion of this region is located immediately upon the river bank, ng northeast to Pensaukin creek, about five miles beyond the city of . From the very early opening of spring in this locality, and the suc- ich attends the early pea culture, it is known as "Pea-Shore." On this strip, vegetables have been raised, with almost uniform success, several a week earlier than on adjoining lands more remote from the river, and ums have been realized from their sale than have been made by the located at Norfolk, Virginia, noted for its extremely early products. e soil is loose, warm, friable, easily drained, readily penetrated by the the early spring sun, and especially protected by the influence which y affords in preventing the escape, by night, of the warmth received by he protecting agency of moisture appears to extend from one-half to arters of a mile from the river, and to be modified by the wind prevail- he time. When the wind is from the west, the later frosts of spring do t the river farms, while those a half mile distant may have their early les seriously injured. Again, in autumn it has been observed that as the winds prevail from the west, passing over the river, the late crops toes do not suffer, while the entire crop half a mile distant, beyond the s, y be entirely destroyed. As if confirmatory of the belief that the influence resides in the presence of humidity, the residents observe s which are perceptibly damp give promise of freedom from frost. on is washed by the Delaware on its northwest side, and has the a spread of water from one to one and a half mile in breadth, includ- low island which may be properly regarded as merely an extension of , as it is, in a great measure, a bog. It is thus favored by proximity expanse of water than the region above or below for many miles. ence of considerable humidity in the atmosphere immediately over a by night, is now known to impede the escape of radiant heat.

early and productive district is part of that through which the Camden oy railroad passes, and which many observers regard with no very e ressions of New Jersey soil for agricultural purposes. An exhil

of the products of a farm lying in this desolate region, so given over tc and barrenness, (in the opinion of many,) may impress an agricultural i with its value as a spot whereon to grow profitable crops of early vegetabl the very vegetables for which Philadelphians so extol their markets, and w indeed, contribute in no small degree to render it a most desirable city for dence.

The following are some of the returns from a farm of about eighty a situated thus favorably—a farm which it may be well to say is valued a wards of $25,000. We will say nothing of the crops of corn, wheat, oats hay, which were considerable—adequate, or nearly so, to maintain the st horses and cows kept upon the farm—but note only that about 5,000 ba of tomatoes were raised thereon in one season, which returned upwards of $3 more than 1,000 baskets of white potatoes, producing $1,200; 1,000 of peas, which sold for more than $800; and 1,000 baskets of other "tr of various kinds, which returned $1,000—making an aggregate, indepe of farm crops, of upwards of $6,000. To produce these large returns d energy, skill and untiring industry, upon a soil admirably adapted to crops, and most favorably located, as we have remarked, combined wit application of a large amount of manures from the city stables, and a l expenditure for fertilizers of several kinds.

STATISTICS OF CAMDEN AND BURLINGTON COUNTIES, N. J.

The success which attends good farming is the best evidence that (adduced in support of the claims of New Jersey to the possession of agricultural advantages. Facts furnish the best reply to the many attack have, from time to time, been made upon the State. We have been fur with the agricultural statistics of the counties of Camden and Burlingt courtesy of the chief of the Census Bureau, which we append for the sa tion of our readers who may be interested therein. The details of pr and the value of products of each township, will render these tables of interest to their residents, respectively.

Townships.	Acres of land.		Cash value of farm.	Value of farming implements and machinery.	Live stock, June 1, 1860.								Produce during the year ending June 1, 1860.				
	Improved.	Unimproved.			Horses.	Asses and mules.	Milch cows.	Working oxen.	Other cattle.	Sheep.	Swine.	Value of live stock.	Wheat, bushels of.	Rye, bushels of.	Indian corn, bushels of.	Oats, bushels of.	Wool, pounds of.
Stockton	5, 586	596	$844, 500	$18, 575	257	19	285	......	51	70	730	$35, 925	4, 973	5, 040	20, 385	530	162
Camden city	165	......	230, 500	350	8	......	15	......	......	......	29	1, 350	200	172	1, 400	275	......
Newton	7, 260	265	1, 275, 735	24, 700	314	37	748	5	105	203	1, 093	47, 350	13, 416	1, 465	44, 785	4, 214	466
Delaware	11, 873	2, 191	1, 225, 610	37, 975	478	43	1, 180	......	381	619	1, 975	91, 575	18, 648	4, 707	68, 457	6, 972	1, 904
Union	320	83	70, 100	750	18	......	33	......	1	......	47	1, 900	......	180	425	......	......
Centre	5, 481	1, 589	645, 960	17, 245	242	14	477	......	109	231	790	31, 403	9, 748	1, 490	34, 700	1, 931	542
Gloucester	7, 601	3, 475	498, 600	20, 755	241	31	460	2	219	283	1, 010	43, 200	9, 415	5, 455	35, 205	2, 705	461
Waterford	4, 565	3, 228	359, 000	8, 300	160	28	312	......	109	53	658	24, 375	3, 468	4, 079	21, 390	2, 645	......
Washington	7, 001	1, 913	505, 600	16, 805	222	40	339	13	316	129	945	44, 450	5, 926	6, 818	40, 450	2, 935	160
Winslow	2, 412	1, 252	120, 800	3. 625	50	21	108	......	75	6	248	10, 350	798	2, 407	7, 375	440	......
Monroe	3, 470	3, 245	215, 700	8, 925	129	20	172	......	159	21	355	19, 425	2, 884	3, 786	16, 950	2, 173	......
Total	55, 734	17, 837	5, 992, 105	158, 005	2, 119	253	4, 129	20	1, 525	1, 615	7, 880	351, 303	60, 476	35, 509	291, 522	24, 820	3, 695
Camden county in 1850	53, 968	77, 416	4, 651, 048	153, 622	1, 924	377	3, 669	57	1, 330	2, 133	9, 107	344, 363	66, 440	22, 138	259, 684	22, 139	2, 777
Increase	1, 766	59, 579	1, 341, 057	4, 383	195	......	460	......	195	......	......	6, 940	3, 036	13, 461	31, 838	2, 681	918
Decrease	......	......	......	......	......	124	......	37	......	518	1, 227	......	......	......	......	......	......

Agricultural statistics of Camden county, New Jersey—Continued.

Townships.	Produce during the year ending June 1, 1860.																
	Peas and beans, bushels of.	White potatoes, bushels of.	Sweet potatoes, bushels of.	Barley, bushels of.	Buckwheat, bushels of.	Value of orchard produce.	Wine, gallons of.	Value of produce of market gardens.	Butter, pounds of.	Cheese, pounds of.	Hay, tons of.	Clover-seed, bushels of.	Hops, pounds of.	Molasses, gallons.	Beeswax, pounds of.	Honey, pounds of.	Value of home manufactures.	Value of animals slaughtered.
Stockton	1,087	15,190	26,782	....	480	$1,450	....	$120,450	28,665	....	733	....	....	....	....	....	$30	$14,152
Camden city	....	700	100	....	160	50	10	200	1,000	....	36	....	....	....	....	....	....	200
Newton	97	51,225	12,220	60	298	2,030	....	36,603	114,850	....	3,166	....	....	....	....	....	....	21,155
Delaware	22	75,930	12,135	....	761	4,753	5	16,965	132,982	4,950	4,360	27	....	....	33	366	15	37,976
Union	44	1,650	1,175	....	60	....	....	7,650	1,095	....	72	....	....	....	....	....	....	996
Centre	47	30,970	17,215	....	546	1,505	....	11,020	54,280	18	2,166	....	32	36	....	....	8	12,899
Gloucester	730	54,375	9,355	....	2,208	150	2	250	24,925	3,318	1,290	12	....	....	....	....	....	16,363
Waterford	....	21,315	1,754	....	830	....	....	100	16,100	100	932	....	....	....	....	100	....	7,704
Washington	....	73,850	4,723	....	1,187	250	....	....	26,450	400	1,309	52	....	....	....	200	200	15,990
Winslow	....	7,675	755	....	478	....	....	....	6,250	....	283	....	....	....	....	50	....	2,794
Monroe	....	21,705	885	....	1,352	....	....	500	11,620	....	257	10	....	....	....	100	....	6,170
Total	2,627	354,585	87,099	60	8,360	10,188	17	193,738	418,217	8,786	14,604	101	32	36	33	816	253	136,399
															849			
Camden county in 1850	27	307,869	65,191	....	10,620	20,805	....	42,301	299,856	20,882	12,946	25	297	30	2,554		216	72,382
Increase	2,600	46,716	21,908	60	....	....	17	151,437	118,361	....	1,658	76	....	6	....	....	37	64,017
Decrease	....	....	....	....	2,260	10,617	....	....	....	12,096	....	....	265	....	1,705		....	....

Townships.	Acres of land. Improved.	Acres of land. Unimproved.	Cash value of farms.	Value of farming implements and machinery.	Live stock, June 1, 1860. Horses.	Asses and mules.	Milch cows.	Working oxen.	Other cattle.	Sheep.	Swine.	Value of live stock.	Produce during the year ending June 1, 1860. Wheat, bushels of.	Rye, bushels of.	Indian corn, bushels of.	Oats, bushels of.	Tobacco, pounds of.	Wool, pounds of.
Bordentown	5,062	275	$501,185	$13,050	267	26	46	8	163	429	926	$56,575	8,782	2,799	19,650	17,103	8,500	699
Chesterfield	16,728	1,281	1,241,538	29,685	460	60	857	4	439	2,299	3,343	1,111,925	14,752	8,143	71,260	31,990		5,959
Mansfield	17,301	930	1,583,641	48,417	633	54	1,557	15	803	3,736	4,155	163,985	24,024	8,319	93,270	44,925		5,614
Burlington city	1,258	176	156,200	5,420	11	6	76		32	21	157	10,500	931	430	3,310	750		
Burlington town	56,100	807	706,200	15,700	218	18	450	2	129	300	668	40,984	6,596	3,557	22,635	6,656		921
Springfield	15,982	906	1,620,800	51,215	544	57	1,713	26	925	2,877	4,793	181,739	16,036	17,806	101,028	28,638		8,517
Hanover	16,514	8,185	1,677,000	39,935	645	101	1,270		671	3,517	6,032	162,638	13,629	22,253	123,280	23,549	300	11,372
Northampton	585½	13	120,900	1,780	31		68		7	21	121	8,205	1,185	350	4,200	595		
Beverly	2,116	505	784,000	6,875	96	7	114	2	51		275	13,250	2,352	1,344	7,970	160		
Willingborough	3,271	538	326,000	11,800	140	2	257		104	84	393	26,840	4,346	1,462	12,470	4,800		
West Hampton	8,658	895	1,013,600	26,620	325	14	863	2	333	752	1,775	95,292	14,913	5,690	49,838	20,062		2,083
Cinnaminson	7,146	2,055	744,090	29,715	286	55	496		189	154	755	55,587	10,665	4,343	30,335	2,163		169
Chester	8,647	1,188	1,002,100	44,320	435	45	856	2	250	239	1,145	86,801	17,919	2,053	45,185	12,360		430
Lumberton	9,580	1,515	968,200	41,185	418	31	867	20	428	1,219	2,152	103,321	10,907	11,973	71,835	9,715		2,883
Pemberton	9,926	505	284,000	6,875	96	7	114	2	51		275	13,250	2,352	1,344	7,970	160		
Evesham	16,821	2,565	1,589,105	70,150	799	106	1,722	18	571	2,101	2,305	176,307	14,736	15,247	1,112,035	13,044		4,356
Medford	7,960	1,467	820,950	33,675	358	47	783	4	318	1,904	1,381	95,172	2,130	15,242	55,400	3,463		4,047
Southampton	12,685	20,616	1,406,430	39,312	519	29	1,208	40	708	1,918	4,412	159,674	8,607	24,572	105,525	6,952		5,382
Shamong	4,778	3,600	297,250	13,865	174	37	358		194	112	968	42,675	896	7,964	25,686	2,517		329
Washington	1,248	34,860	180,700	3,200	41	42	127	10	129		312	14,980	126	1,418	6,115	288		
Egg Harbor	3,801	25,934	287,450	7,552	127	12	364	52	400	201	623	29,502	2,824	2,677	13,392	1,938		347
Total	226,167½	108,816	17,311,339	540,346	6,623	756	14,166	207	6,895	21,884	36,966	2,649,202	178,708	158,986	1,982,389	231,828	8,800	53,108
Burlington county in 1850	132,017	40,670	11,666,550	316,217	5,203	413	12,545	572	8,004	20,981	35,376	1,063,412	152,369	118,920	883,011	159,398		43,781
Increase	94,150½	68,146	5,644,789	224,129	1,420	343	1,621			903	1,590	1,585,790	26,339	40,066	1,099,378	72,430	8,800	9,327
Decrease								365	1,109									

[illegible]ultural statistics of Burlington county, New Jersey—Continued.

Produce during the year ending June 1, 1860.

[illegible]	Peas and beans, bushels of.	White potatoes, bushels of.	Sweet potatoes, bushels of.	Barley, bushels of.	Buckwheat, bushels of.	Value of orchard products.	Wine, gallons of.	Value of products of market gardens.	Butter, pounds of.	Cheese, pounds of.	Hay, tons of.	Clover-seed, bushels of.	Grass-seed, bushels of.	Hops, pounds of.	Molasses, gallons of.	Beeswax, pounds of.	Honey, pounds of.	Value of home manufactures.	Value of animals slaughtered.
Bordentown	47	8,550	8,435	210	780	$5,295		$9,425	17,960	300	1,572					22	280		$9,651
Chesterfield		18,510	1,791	90	582	2,437	25	1,000	38,563	1,540	3,176	13	4			8	465		58,301
Mansfield	1,092	33,254	3,736	85	2,511	4,110	6,018	18,425	98,148	3,120	4,931	48	583	76	*284	36	1,122	$25	59,942
Burlington city	473	3,325	1,625		130	325		12,490	4,430		250		10	5			220		2,483
Burlington town	658	12,026	3,360	300	1,181	2,095	5	27,006	23,600		1,326		8			21	281		11,219
Springfield	141	31,152	2,664		2,668	2,157	26	1,540	55,931	1,579	6,310	3	24		†35		515	50	55,797
Hanover	13	27,644	1,544		2,230	2,416			70,304	8,343	3,906	68	71			85	1,037		119,796
Northampton	8	1,650	170		120	65	5	975	4,350		204		200						1,354
Beverly	267	5,205	5,825		501	1,305		25,075	5,820		268								3,155
Willingborough	82	9,155	4,205		674	1,270		11,175	18,145	300	1,084	12	34						7,585
West Hampton		19,505	1,472		886	1,215	90	1,215	30,060	10,050	3,231	65	29		†20				21,853
Cinnaminson	679	24,544	39,332		1,046	4,748	15	85,132	29,103	110	1,733	18	31	152		51	835		16,546
Chester	123	42,010	8,494		1,299	10,085	136	33,051	59,176	3,460	4,148	43	12	96		24	670		29,083
Lumberton	72	44,425	3,843		1,944	2,475	94	3,970	30,713	2,600	3,829		46	55			400		46,555
Pemberton	81	28,850	2,417	10	3,447	455	45	300	32,084	1,410	3,411	1	123		*40	52	700	300	32,130
Evesham	26	86,656	13,936		3,375	7,402	98	30,230	68,853	38,113	8,059	52	2	168		1	863		59,162
Medford	1	30,110	9,662		2,880	2,323	112	2,920	29,488	17,931	3,714			150			773		34,396
Southampton		36,856	2,536		7,131	1,993		100	44,870	7,750	4,762	2	68	50		7	1,550		73,287
Shamong		12,249	870		1,750	811	3	2,188	16,862	532	1,490			60			693		15,591
Washington	10	2,350	402		173			1,000	4,310		414						61		3,259
Egg Harbor	4	7,144	1,500		1,536	115			11,705		2,447					14	150		7,981
Total	3,777	485,260	117,819	695	36,844	53,097	6,672	267,217	694,475	97,158	60,265	325	1,245	812	379	321	10,615	375	669,126
Burlington county in 1850	2,048	364,461	47,682	10	29,744	53,433	255	51,639	688,869	238,940	41,783	115	582			10,936 3,050		433	394,380
Increase	1,729	120,799	70,137	685	7,100		6,417	215,578	5,606		18,482	210	663	812	379	7,886			274,746
Decrease						336				141,782								58	

* Maple.

† Sorghum.

From the Census Report of 1850 we learn that there was in Camden county, New Jersey, 731 farms, comprising 53,968 acres of improved land, and 77,416 acres of land unimproved. The latter included all such as was in occupancy and necessary to the enjoyment of the improved portions, though not itself reclaimed. These 731 farms, therefore, embraced an area of 131,384 acres. The distinction between improved and unimproved land is not very clearly drawn, as it is plain, from the result attained, by dividing the total number of acres by the number of farms, the quotient, 180 acres, as the average extent of the farms of Camden county, being quite too great. Much land which is neither meadow nor wood land attached to the farm has been included in the contents erroneously. If one-half the unimproved be considered as forming part of the farm, the average of each will be found to be 126 acres, and the value per acre $52, according to the Census Report of 1850. The total value of farms (implements included) was $4,804,670. According to the census of 1860 the farms of said county em-
ed 55,734 acres of improved, and 17,837 of unimproved land. The amount
nproved is thus greatly reduced by the latter census, and more just distinction
le between that occupied and useful, and that unoccupied and unproductive.
eventy-seven, in the report of 1850, is probably an error for seventeen, easily
ade by a copyist.) The total number of acres, properly considered farm land,
ecomes, therefore, in 1860, 73,571; and if the farms have not increased in
umber, the average number of acres in each becomes 100, which appears to be
erv nearly correct. The total value of farms and implements being nearly six
ns of dollars, gives to each acre an average value of 83 $\frac{50}{100}$ dollars. As
area of the county of Camden is 173,000 acres, there remain nearly 100,000
s unoccupied, and unreported by the census of 1860. This is mainly com-
l in extensive tracts of unreclaimed brush lands and cedar swamps. A
ued comparison of the census tables for 1850 and 1860 will indicate a gen-
al advance, and, in some products, an extraordinary increase during the ten
ears which intervened. Thus the land and implements in the county of Camden
ere valued at $1,345,440 higher in 1860; the wheat showed a small decline of
ut 3,000 bushels; rye and oats a considerable falling off; white and sweet
es an increase together of about 70,000 bushels; butter exhibits an in-
d product of about 18,000 pounds, while cheese declined 12,000 pounds;
y an increase of 1,658 tons; sheep declined 518, and swine 1,227; neat cattle
creased but 618; horses increased 195, and asses and mules declined 124;
hile the value of animals slaughtered was nearly doubled. The returns of
chard products were, in 1860, but half those of 1850, having declined upwards
$10,000. The market garden products had advanced from $42,301 to $193,738,
ease of $151,437, or nearly 360 per cent. The last census inquiry was
five years ago, and cannot exhibit the aggregate products of the county at
s . These are no doubt much in excess of those of 1860, the crops of
kinds gathered in 1864 having been of extraordinary yield, and above the
e of some years previous.

The county of Burlington, adjoining Camden on the northeast, is much more
tensive, and exhibits, according to the last census, much greater aggregates of
oducts and value, having nearly 900 more plantations, and an extent of im-
oved and unimproved territory of 324,983 acres, or nearly three times that of
en. Here, also, is exhibited a general advance in value and production
is very gratifying. If we may believe the report, of improved lands nearly
) acres have been taken into cultivation during the ten years prior to
; the farms improved in value to the extent of five and a half millions of
; the wheat increased 26,000 bushels; rye and oats together increased
out 112,000; corn 1,100,000; white and sweet potatoes together upwards of
00; buckwheat 7,000; wine 640 gallons; butter increased 5,606, while
declined 141,782 pounds; hay showed an increased product of nearly
000 tons; sheep 903; swine 1,590 more; cattle of all kinds 3,076 increase;

and horses and mules were, together, in 1860, more numerous by 1,763 than in 1850; while the value of animals slaughtered increased $275,000. The orchard product was almost identical in value with that of 1850, while the market garden product advanced from 51,639 dollars in 1850, to 267,217 dollars in 1860, a gain of 215,578 dollars, or about 418 per cent. increase in ten years.

Burlington county was divided, according to the Census Report of 1850, into 1,638 farms, which were valued in 1860 at seventeen and a half millions of dollars. The farms averaged 112 acres each, and were estimated worth $63 75 per acre, or about $20 per acre less than the farm lands of Camden. Upwards of 300 square miles of Burlington, near the Delaware, extending twelve miles therefrom, is a fine fertile loam; the rest of the county is sand, or a sandy loam. About 100 square miles of Camden contains the same superior soil as that in the western part of Burlington; the remainder, 173 square miles, is sandy, and cannot be so readily improved. One-half of Burlington is thus of excellent quality, while only about one-third of Camden is highly productive. This difference in the relative extent of the improved soils may account for the more rapid development of the larger county.

PRODUCTS OF SEVERAL CAMDEN FARMS IN 1864.

From a large number of returns to queries distributed among the farmers of Camden county, and responded to by many intelligent, public-spirited gentlemen, we select the following interesting details. Many of the returns cannot be used because imperfect and irregular. Sixty contain details sufficiently clear and full to serve our purpose, for though they represent but one-twelfth of the number of farms in the county, they vary in size from 8 to 500 acres, and in productiveness from very best, perhaps, to very worst, and may be considered representatives of the county, or more properly of the northwestern or cultivated portion:

Number of acres in farms	6,132.75
Number of acres arable	4,852
Number of acres woodland, &c	1,280.75
Average acres in each farm	102.21
Average acres arable	80.82
Average acres woodland, &c	21.34
Average acres in each farm in 1860	100.62
Value of farms	$747,130
Value of implements	22,526
Value of products	271,128
Average value of farms	12,452
Average value of implements	523
[illegible] product of each farm	4,518
[illegible] value per ac[illegible]	121
[illegible] ue in 18[illegible]	83

[illegible] farms [illegible] ary, 1865:

[illegible] 236, valu[illegible]	$26,[illegible]
[illegible] lue[illegible]	6,[illegible]
[illegible]	16,[illegible]
	49,670

315, valued at	$5, 300
cattle, 102, valued at	8, 325
nd lambs, 191, valued at	1, 295
512, valued at	16, 671
s, &c., valued at	2, 800
	34, 391

horses to a farm	3.68
mules on 14 farms	2.42
cows on 58 farms	5.10
value of horses	$112 00
value of mules	185 00
value of cows	38 00
value of fatting cattle	81 61
value of sheep and lambs	6 75
value of swine	32 56

the above 60 farms the following products were obtained in 1864;

bushels	8, 188	Valued at	$20, 499
shels	664	Valued at	1, 237
corn, bushels	27, 194	Valued at	44, 505
ishels	3, 498	Valued at	2, 635
bushels	240	Valued at	456
ieat, bushels	159	Valued at	190
, bushels	4, 636	Valued at	2, 364
bushels	1, 877	Valued at	1, 450
ds, bushels	50	Valued at	20
otatoes, bushels	36, 185	Valued at	46, 848
otatoes, bushels	15, 772	Valued at	16, 738
ns	1, 797	Valued at	43, 842
n, gallons	307	Valued at	400
			181, 184

et garden products, growth of 1864:

es	151,812	Value of cabbages	$16,581
es, baskets	18,025	Value of tomatoes	10,555
nts, baskets	856	Value of egg plants	234
elons	7,230	Value of watermelons	696
baskets	5,631	Value of citron	2,068
s, baskets	281	Value of squashes	131
iskets	3,566	Value of peas	3,195
baskets	926	Value of beans	150
ers, baskets	885	Value of cucumbers	200
, baskets	442	Value of peppers	300
orn, baskets	1,794	Value of sugar corn	1,088
o		Value of rhubarb	500
		Value of asparagus	1,051
s		Value of small fruits	1,116
			37,865

ORCHARD PRODUCTS.

Apples, baskets	9,791	Value of apples	$7,381
Pears, baskets	659	Value of pears	386
Peaches, baskets	322	Value of peaches	477
			8,244

DAIRY PRODUCTS.

Butter, milk, and cheese		$9,454
Farm products, excluding horses, mules, and cows		$34,391
Vegetable products		181,184
Market garden products		37,855
Orchard products		8,244
Dairy products		9,454
Total products of sixty farms		271,128
Value of horses, mules, and cows		49,670
		320,798
Value of farms	$747,130	
Value of implements	22,526	
		769,656
		1,090,454

The average product, per acre, of the sixty farms above referred to, was as follows: Wheat, 15 bushels; rye, 10; corn, 40; oats, 33½; buckwheat, 10; hay, 1.52 tons; white potatoes, 85½; and sweet potatoes, 94 bushels per acre.

By tables prepared for the Department of Agriculture it appears that in 1864 the average yield of wheat in New Jersey was greater than that of any other State except Massachusetts, Rhode Island, and Connecticut—Rhode Island having exhibited a return of 15 bushels, which was identical with that of New Jersey, while Massachusetts exceeded by one, and Connecticut by but one and a half bushel. New Jersey thus still continues to be one of the leading States in wheat production, though not in absolute product, but in yield per acre

In the production of corn in 1864, during which this crop suffered greatly from drought in some sections of the State, New Jersey was excelled by Vermont, Illinois, Iowa, and Minnesota. New Jersey produced 31¾, Vermont 38¾, Illinois 33, Iowa 36⅝, and Minnesota 33 bushels per acre. The average product of the sixty farms under notice, which exhibit a fair sample of the productiveness of West Jersey in the better cultivated districts, is thus, even in a season of drought, greatly in excess of that of any of the most favored western States in the yield of corn. This yield, it will be seen, was forty bushels to the acre.

The product of hay per acre in New Jersey, in 1864, equalled or exceeded that of every other State, Iowa and Kansas excepted, and fell below these States by but a small fraction of a ton. New Jersey was estimated to have yielded 1.57 ton per acre. The above sixty farms produced 1.52 per acre—a close approximation to the estimated return.

The yield of oats, in 1864, per acre, in New Jersey, was exceeded by that of Vermont and Rhode Island only, and but by half a bushel per acre. Most of the States were surpassed by New Jersey in the production of oats, by from

:n bushels per acre. Thirty-two and one-third bushels was the esti- eld throughout the State; in our district, as deduced from reports of ; before referred to, the average yield was 33½ bushels.

xhibiting the number of farms among the sixty from which full returns :ceived, in which leading crops are cultivated, with acres occupied by ·op, product per acre, &c., in 1864.

	No. of farms.	Acres occupied by each crop.	Total product in bushels.	Average product of each farm in bushels.	Average product of each acre in bushels.	Average number of acres in each farm in each crop.
....	57	547	8,205	144	15	9.59
....	......	....	....	....	10	....
....	58	693	27,720	478	40	12
....	33	104	3,498	106	33.63	3.15
....	1	6	240	....	40	6
ıt	10	16.5	159.5	15.95	9.66	1.625
....	58	1,176	1,787	31	1.52	20.28
tatoes..............	63	423	36,185	574.33	85.54	6.71
atoes	44	108	10,152	236.30	94	2.45

foregoing tables of farm crops, averages and values, need no further ion, except the remark that there is necessarily an overestimate therein; the produce, such as grain and hay, which have been transformed into tter, calves, milk, cheese, and chickens, has been already valued and l in the aggregate. This is necessary in order for comparison with the f the Census Bureau, where no distinction is made between vegetable s sold directly and those transformed into animal and again enumerated

ıbove statistics, derived from less than one-twelfth of our Camden county :learly show what energy, combined with skill and capital, can produce e soil of New Jersey. From the reports received we will extract a few examples, which may serve to incite the owner of a poorly worked and :ntly paying farm to emulate the enterprise of his more successful fellow-

y premise that there are few such farms as that whose products we are) ı ıe, and that fewer farmers can bring to the active duties of their on greater skill or intelligence than can the owner of these acres. He y a business man, but he is also intelligent, and by education culti- but such farms might be seen almost everywhere did their owners but ıem what they might become; such men might abound did our young who now seek to dabble in some "respectable" profession, but receive her order of education of which they are lamentably deficient, and apply proved abilities to the redemption of their State from agricultural and contempt.

On this superior farm there were produced in 1864—

225 bushels of wheat on 9 acres, average 25 bushels per acre	$693
550 bushels of corn on 10 acres, average 55 bushels per acre	935
65 tons of hay on 40 acres, average 1.67 ton per acre	2,080
10 tons of straw on 9 acres, average	225
2,000 bushels of white potatoes on 10½ acres, average 112½ bushels per acre.	1,600
Cabbages on 9 acres, average	2,150
Various market-garden products on 8 acres	1,700
Sundry other crops	575
To which may be added for swine $370, and calves $325; the first consumed a portion of the corn, and may not be properly included. Add the latter, with half the value of swine	400
We find a total aggregate product of	10,358

If swine should not be included, we find about $10,000 total product of this fine farm of 100 acres, which doubtless is still much beneath its capacity for production, estimated at the rates for produce which ruled during the year past.

The expense of conducting a farm producing thus largely was correspondingly heavy, and the net returns to the owner were not of so surprising an amount as to tempt any one in good paying oil business to leave his wells to turn farmer, or any gold gambler, who is rolling up thousands by a happy turn, to envy the successful Jerseyman, unless they could at the same time appreciate his untroubled conscience and his peaceful repose. But they are certain gains, and though slowly made at the expense of thought and diligence, have not among them "one dirty shilling."

There are many farmers in Camden county who cannot rest satisfied with indifferent cultivation and meagre crops, whose high farming is attended with corresponding results. Witness one among several well authenticated returns before us, freely given by the public-spirited and enlightened cultivators, who are superior to petty selfish interest, and have reported their crops in full for the benefit of the Agricultural Department and their fellow-workers.

The following is the product of a farm of about 107 *acres of arable land in* 1864

236 bushels of wheat grown on 9 acres, at the rate of 26¼ per acre.	$626 36
1,460 bushels of corn grown on 17½ acres, at the rate of 83.42 per acre	2,190 00
10[illegible] tons of hay grown on 46 acres, at the rate of 2.21 per acre.	3,060 00
[illegible] bushels of white potatoes grown on 11 acres, at the rate of 52 pe[illegible] acre	1,600 00
[illegible] the rate of 473 per ac[illegible]	460 00
[illegible] grow[illegible]	160 00
[illegible] bushel[illegible] turn[illegible]	132 00
[illegible] of butt[illegible]	515 40
[illegible]lk an[illegible]	328 72
[illegible]	382 00
[illegible]	221 00
	9,675 48
[illegible]	380 00
[illegible] value of agg[illegible]	10,055 48

The sales from the foregoing during the year were as follows:

·at		·$626 36
ı, 400 bushels, brought		660 00
ı, (300 bushels remain for sale)		450 00
—60 tons will be sold		1,800 00
.toes, 1,630 bushels		1,550 00
)ages, 2,000		160 00
er, milk and cream		665 12
'es		81 00
s, chickens, &c		140 00
		6,132 48
eaving for consumption—		
ı, 760 bushels, worth	$1,080 00	
', 42 tons, worth	1,260 00	
w, 30 loads, worth	380 00	
ıtoes, 50 bushels, worth	50 00	
'ots, 592 bushels, worth	460 00	
nips, 200 bushels, worth	132 00	
:er, &c., 250 pounds, worth	200 00	
;, $156, beef, $155, worth	311 00	
:kens, eggs, &c., worth	70 00	
		3,943 00
Total		10,075 48

o produce the above crops there were purchased and applied 220 one-horse loads of horse-stable manure, four tons of superphosphate of lime, 1,200 ıels of lime, and forty bushels of ground gypsum or plaster. A herd of dairy ı was kept, and a strong force of horses and mules, which swelled, with straw and corn-stalks, the products of the cow and stable yards. The soil ıis farm is a very strong loam, tillable only by heavy labor in dry weather, incapable of cultivation in wet. Heavy drainage is demanded and has applied, and is continued yearly. The course of cultivation may be ially illustrated by the following outline. It has been the practice to lime sod one year (or immediately) preceding the plowing, with about eighty els of quick-lime per acre. The plowing for corn is done in the fall, as ly as possible, that by freezing and thawing the clay may be ameliorated. only manure applied was a compost consisting of 150 pounds of superphos-e of lime, (or 200 pounds of poudrette, and fifty pounds of fine bone-dust,) bushel of gypsum, and five to ten bushels of charcoal-dust to an acre. compost was strewed along the drills, which were four and a half feet t, and the seeds dropped in the drill by hand, one foot distant from each :. The ground was kept constantly stirred and every weed eradicated. rotation observed is that usual in the district. First, corn on a turned sod; second, white potatoes, which prepare the ground thoroughly for ıt, which follows; third, grass-seed is sown on the wheat in the autumn clover-seed in the spring following; fourth, after this the grass is mown hree years, and pastured for one year, when it is again ready for turning r by the plough to feed, by its decay, the crop of corn to be therein planted s turn. The success attained is the result of abundant drainage, deep ing, ample fertilizing, and close attention to the eradication of weeds by ant and thorough culture.

Another farm thoroughly tilled by its intelligent and progressive owner, but larger than the preceding by a few acres, produced, in 1864, the following respectable array of crops:

300 bushels wheat, on 10 acres, at the rate of 30 bushels per acre.	$750 00
800 bushels corn, on 10 acres, at the rate of 80 bushels per acre..	1,200 00
84 tons hay, on 33 acres, at the rate of 2½ tons per acre.......	2,520 00
1,615 bushels white potatoes, on 10 acres, at the rate of 161½ bushels per acre....	2,500 00
312 bushels sweet potatoes, on 2 acres, at the rate of 156 bushels per acre....	700 00
100 bushels turnips....	40 00
200 bushels carrots, on 1 acre....	160 00
2,000 cabbages....	120 00
Sundry small crops....	362 56
	8,352 56

Cattle slaughtered....	$150 00	
Lambs....	110 00	
Swine 24, weight 4,900 pounds, at 16 cents....	800 00	
Calves 6, weight 1,200 pounds, at 10 cents....	120 00	
		1,180 00
Aggregate product of farm....		9,532 56

Two hundred cart-loads of manure were purchased and applied, 55 loads of street dirt, and 100 tons of green sand "marl." A dairy of superior cows is kept, and six horses and mules, and a flock of sheep.

The following was the product of a farm in Stockton township, in that desolate region so little admired by the passing agriculturist, on his way to or from New York or Philadelphia. This farm comprises eighty acres, and is valued at $25,000, or more than $300 per acre. To its worth its products will testify:

92 bushels of wheat, on 8 acres, at the rate of 12* bushels per acre....	$248 40
10 bushels of rye, on 1 acre, at the rate of 10 bushels per acre.	17 00
200 bushels corn, on 5 acres, at the rate of 40 bushels per acre.	350 00
11 tons hay, on 6 acres, at the rate of 1¾ ton per acre........	220 00
1,136 baskets white potatoes....	1,238 00
18,000 cabbages, on 5 acres, at the rate of 3,600 per acre........	720 00
4,876 baskets tomatoes....	3,155 32
[illegible]69 baskets citrons....	187 60
[illegible]8 baskets squashes....	37 60
[illegible] baskets peas....	834 40
[illegible] baskets bea[illegible]....	29 00
[illegible] baskets [illegible]....	102 00
[illegible]....	210 00
[illegible]....	45 00
[illegible]....	94 50
	7,488 82

[illegible] for the county in 1864.

There were applied of purchased manure 450 cart-loads, 2 tons of guano, 1 ı of bone-dust, and 2 barrels of superphosphate of lime.

The large products of a few acres confirm the maxim that a small farm well led will produce the largest returns per acre. The exhibit is here, as else- ıere, the gross results; with cost of production we do not concern ourselves; ery farmer may judge of the expense attending high farming for himself, ways bearing in mind that it is, if judiciously conducted, abundantly more re- rative than the ordinary indifferent scratching called farming.

Un less than eight acres there were raised in 1864 the following crops:

50 baskets of white potatoes, which were sold for	$400
14 baskets of sweet potatoes, which were sold for	413
00 baskets of turnips, worth	60
00 baskets of carrots, worth,	160
58 baskets of sugar corn, worth	135
65 baskets early peas, worth	35
heads of cabbage	54
	1, 257

An extraordinary yield of tomatoes was destroyed by an unusually early frost. lotwithstanding the gross results exhibit a return of $143 68 per acre, this ll farm lot, it is unnecessary to say, was already in high condition, having ceived heavy dressings of manure, street dirt and marl, for many years past, ıd as heavily cropped and thoroughly worked by its skillful and industrious mer. To the crop of 1864 there were applied 75 cart loads of manure, 125 ads of street dirt, and 40 tons of marl.

We have returns of products of farms of 90 acres and upwards which do not thibit crops of the gross value of $2,000, though favored by the help of a herd cows. The reason is obvious—no manures were purchased by the careful ator, no return was made of phosphoric acid and potash to supply the aste from continual cropping.

On eleven acres the product in cabbages in 1864, which was an extraordinarlly vorable season, both as respects the perfection of crops and prices, 41,000 cab- s were grown, which sold for the large sum of $3,274 53. This is nearly per acre. A wagon load of these cabbages, containing 800 heads, sold r $100.

On two acres, which of course had received the benefit of the applications to ıy previous crops, there were grown, in 1864, 300 baskets, each ⅝ of a bushel, early potatoes, which sold for $1 25 each, and returned $375; 7,500 cabbages, hich sold for $10 per hundred, $750; making a total gross return of $1,125— ıverage gross product per acre, scarcely exceeded by any yield of which we ognizant, a large return for egg-plants only excepted.

The above yield of cabbages is exceeded by that given by another skillful r, whose aggregate of sales from fourteen acres exceeded $5,500—an av- product per acre of quite $392 Some of these cabbages brought $15 per ed, and the best load sold for $115.

The largest product of cabbages was that given upon 30 acres, which reached e large amount of 175,000, and sold for about $9,000; but in productiveness r acre this must yield to the second above noted, which is certainly extraor- ı . The farm upon which the cabbage crop was given, which sold for produced also, in 1864, upwards of 100 tons of hay, besides other farm . The hay was probably worth $2,500 to $3,000, and swells the total of s to $11,500 or $12,000 for these two items alone. Upon the same farm, w the hands of a citizen, the former owner was unable to maintain his , but eked out a precarious existence by cutting wood, &c.

Sweet potatoes were remarkably productive in the season of 1864. From returns perfectly reliable we learn that on 6½ acres there were grown 1,700 baskets, or at the rate of 261 baskets (or 163 bushels) per acre, which sold for $1,700, or at the rate of $261 per acre. By the same grower there were produced 22,000 cabbages on 10 acres, which sold for $2,000. A crop of early potatoes was raised by the same energetic farmer, which returned, from 3 acres, upwards of $500. Turnips were sowed on the drills without ploughing, and a crop of 1,400 bushels raised therefrom, which brought $420. This sum, with the proceeds of the early potato crop, amounted to upwards of $900, or quite $300 per acre.

Farming and vegetable growing are not conducted on small plots only with success. We have had returns of potato growing on a scale of considerable magnitude. On thirty-two acres there were raised, in 1864, 3,274 bushels of white potatoes, which sold for $4,800. On the same farm, upwards of 40 acres produced nearly 50 bushels of corn to the acre, though the season was quite unpropitious, or more than 2,000 bushels, which, at present rates, are worth quite $3,500. On the same farm, cattle to the value of $6,000 were fatted.

It must not be supposed, nor is there any probability that the above recitals of large crops and heavy returns per acre, under high manuring, and large expenditure for fertilizers, will induce the reader to imagine that these are very common cases, or that the farmers of Camden county are rapidly becoming rich. There remains the per contra—the debit side—where poor farming without capital, small spendings by timid, old-fashioned men, who decry all the innovations which the agricultural press is continually urging upon their attention, result, as it should, in poor returns, which have kept, and ever will keep, such farmers poor. Some of these men are scarcely making their expenses. They are deriving no advantage from the present high rates of farm produce, because they have no surplus to sell; while they are oppressed by the increased cost of every article entering into the list of domestic expenditure. These not having moved with the tide, will be left stranded when it retires.

The record is before me of a farm of 100 acres, nearly all arable, from which less than $2,000 gross product was taken. Nor is this a solitary case. This poor exhibit is made for a farm of good quality, capable of largely increased product, as is proved by the returns of that adjoining it of similar soil, &c. The latter, about 90 acres arable, presented a gross return of more than $7,000. The yield of hay of the latter was 2½ times greater; that of corn, nearly twice as great; of potatoes, 2½ times; turnips, 4 times larger in the well-tilled farm than on that poorly managed. Both farms are occupied by tenants, but of very different character, education, and capacity.

From another farm of thirty-six acres the gross returns were made of but $375, which may be placed on the scale against another of twenty-five acres, which showed an aggregate value of crops of about $2,500. Finally, we have received returns of total products of a farm of one hundred acres in Camden county, whose aggregate yield for 1864 amounted to $15,000, the sales of vegetable products alone having exceeded $12,000, a yield and gross product unsurpassed by any other cultivator with whose success we have become acquainted.

The following statement was made to the Burlington County Agricultural Society, by J. and S. Butterworth, extensive farmers of that county, and will show the products and profits of their farm during the year 1863. There are 248 acres in this farm, exclusive of 20 acres of woodland pasture.

Statement of products.

f hay, at $14	$3,085 00
ls white Kentucky wheat, at $1 75	1,575 00
ls potatoes, at 50 cents	150 00
hels corn, at 75 cents	1,350 00
	50 00
f beef cattle, at $70	4,200 00
at $4 50	337 50
at $4 50	337 50
ls of wool, at 70 cents	196 00
unds of pork, at $6	720 00
	480 00
'fat cattle	250 00
tal	12,731 00

Statement of net receipts.

in 80 head of fat cattle	$2,180 00
in 75 lambs, at $4 50	337 50
in 75 sheep	75 00
ds of wool, at 70 cents	196 00
'fat oxen	100 00
	50 00
els of potatoes, at 50 cents	150 00
nds of pork, at $6	720 00
	480 00
f hay, sold at $14	700 00
straw, at $10	40 00
els corn, at 75 cents	450 00
els white wheat, at $1 75	1,470 00
	6,948 50

t of expense attending the conduct of the above farm, net profit, and interest on the investment.

the farm of 268 acres, at $125 per acre	$33,500 00
at $125 each	500 00
oxen	140 00
attle, at $32 each	1,920 00
at $3 50 each	262 00
at $5 each	250 00
ployed and board of men	1,150 00
lements	600 00
ed wheat deducted from net profits)	60 00
l tear of buildings, fences, and implements	500 00
s purchased, (500 bushels of lime, at 14 cents)	70 00
	160 00
tal invested in farm and working material	39,112 00

ofit, as stated above, $6,948 50; being 17 7-10 per cent. on the in-

The above farm is located in the "green sand marl" region, and 300 tons this fertilizer are annually applied; but as this is digged on the farm, the co of digging only is included in the above account.

MARKET GARDENING IN NEW JERSEY.

While New Jersey is unsurpassed in the excellence of her market products, in the aggregate she is exceeded by New York alone.

According to the census of 1850, the product of New Jersey was valued $475,242, and in 1860 at $1,542,155—an increase of quite 210 per cent. D aware and Virginia exhibited the same growth; Maryland increased 150 p cent.; Pennsylvania 100 per cent.; but all the seaboard States, except Sou Carolina and New York, were equalled or surpassed by New Jersey in th gain in the ten years from 1850 to 1860. In South Carolina garden produc were quadrupled, and nearly the same growth appears in the State of New Yor New York and New Jersey produce most of the vast supplies of green veg bles consumed in the great cities on their borders. As the population of the city New York increased but 56.27 per cent., Brooklyn 175.37 per cent., Philadelph 65.43 per cent. in the ten years under notice, and the market-garden produc of the States which supply the vegetables in demand in these cities have, duri the same time, known a growth of from 210 to 370 per cent., we may conclu that either a much larger quantity was consumed by each family than formerl or that the price had proportionably advanced. As there does not appear have been any material advance in prices before or during 1860, the first co clusion is sustained. Whether this increased consumption of vegetables h arisen from the increased attention to early production, to the cheapened supp of small fruits, to greater demand for winter preservation in air-tight cans, superior horticultural knowledge, or to greater regard for health, we cannot d termine. All these influences have, perhaps, combined in producing a great increased consumption of a variety of food which cannot but be advantageous both producer and consumer.

By examination of the way bills of produce received at Camden, (which one of sixteen platforms where market-garden vegetables are received for tra portation to New York,) we learn the following interesting statistics:

There were received at the Camden depot, and shipped to New York—
From May 18 to June 6, 1,877 barrels of peas.
From June 19 to July 2, 3,298 barrels of beans.
From June 28 to August 10, 9,831 baskets of tomatoes.
From July 9 to August 19, 2,281 barrels of cucumbers.
From August 2 to August 17, 1,016 barrels of citrons.
From August 3 to December 31, 15,660 barrels of sweet potatoes.
From July 20 to September 23, an enormous freight of peaches.

The above peaches and sweet potatoes were not all the product of this A very heavy freight business was done in produce by the line of ste o the bills of which we have not examined. Peaches are grown in M county, New Jersey, to a very large extent. So great is the supply from region, that it has been estimated that there has been sent thence to New Y alone, an amount equal in bulk to all the fruits consumed in Great Britain at a cost less than ten per cent. of the European prices.

Were we able to obtain returns of produce received at the way-side platfor which line the road, the aggregate would appear enormous—sufficient, to stagger belief, and exhibit in strong colors the dependence of New York up the productions of "poor Jersey."

MARKET GARDENING IN CAMDEN COUNTY.

The growers of early market vegetables enjoy but short respite from active or during the winter. Their attendance on the markets for the sale of late-keeping produce has not ceased before they open the spring campaign with preparation of hot-beds and ploughing for the crop of early peas. Their teams, also, have been busy during the winter in hauling stable manure from the wharves or landings on the creeks where it has been deposited, unloaded from the sloops and flat-boats which navigate these streams. The sloops, carrying from 125 to 200 one-horse cart-loads of manure, are floated up on the tide and return by the current. Their services are invaluable to the farmers of the interior, bearing, as they do, a burden of heavy and bulky material which could not be economically conveyed by wagons to the same distance from the city. Districts situated in the vicinity of such streams and landings are, in consequence, more readily cultivated than those more distant, and agriculture in general declines in proportion to the remoteness from the facilities commanding a cheap supply of manure. The lands in the interior of New Jersey have not been in demand, mainly because they are distant from the source of supply of enriching agents, and can never compete with those more favored by proximity to creeks or the Delaware. The farmers who reside within a moderate distance of the "green-sand marl" pits employ their teams during the winter in hauling immense quantities of this fertilizer. Many deem it worth hauling upwards of five miles, and apply many tons of the heavy material annually to their land. The "marl" thus carted has been bought by the rod in the ground, reaching to the depth it is found possible to dig without interference by water, which is from 8 to 12 feet. A square rod will sometimes furnish upwards of 100 to 120 tons, and must be dug and thrown out at one operation by a strong gang of men, many of whom are professional diggers, and expert at handling their peculiar long-bladed semi-cylindrical spades. The rich dark-green material, quite moist, is easily cut like new cheese, and a full gang will throw out half a rod readily in a day. Large quantities of this "marl" are conveyed on the Camden and Atlantic railway to various points between Camden on the west, and into the interior eastward, at rates varying in 1865 from eighty cents to one dollar per ton. An ordinary four-wheeled gravel or dirt car will hold about 14 tons.

TOMATOES, EGG-PLANT, AND EARLY PEAS.

The earliest preparation of hot-beds in Camden takes place among the "Pea-Shore" truck men, who, about the 20th of February, generally bestir themselves. These beds are of the usual kind—depth of about 14 inches of good fresh horse manure, well shaken up, and then slightly compressed, being deemed sufficient. On this about four inches of mellow, dark soil is spread, and the seeds of early tomatoes, egg-plant, &c., sown in drills. In the choice of seed the growers are especially careful, well knowing that their success depends in great measure upon the early ripening quality of the plants. Some successful raisers of early tomatoes carefully select the earliest, smoothest, fairest, and largest for seed, year after year, and thus secure a variety which can compete with any to be had at the seed stores, not always so carefully selected. The best seed of early tomatoes is generally scarce, and, at times, commands as much as six dollars a pint. The seeds are sown rather thickly in the hot-bed, and the plants are carefully watched, aired on proper occasions at mid-day, and covered with old hay during stormy or cold weather. When the plants have attained the height of four or five inches, and are proportionally strong, they are carefully drawn and transferred to a cold frame, also covered with glass, and having a few inches of rich old soil and old manure beneath.

In this they are "spotted out" about four or five inches apart each
Under glass, again carefully watched, ventilated, covered with hay in wi
stormy, or cold spells, they grow and develop abundant roots, acquire a st
habit, and, as soon as all danger from frost is past, (generally about the
week of May,) they are ready, after a slight exposure without glass by
to endure the trials of the outer world. Tomatoes and egg-plants having
placed under favorable conditions in the hot-beds, the early peas next req
attention, should the earth have become dry and ready for the plough.
is often, on the light, warm soils, in sheltered fields, (where this vegetabl
most successfully grown,) as early as the middle of February, or, at the la
the 1st of March, but has been delayed some years to so late as the 25t
March. The preparation of this crop is a simple ploughing and furrowin
drills 2½ feet distant. Stable manure, well rotted, is lightly strewn along
drills from one-horse carts at the rate of about 12 loads per acre, a very
portion only being needed, as the product is removed before ripening, and
mands but a small amount of nutriment. The peas are sown by h
(thrown by the handful along the drills rather thickly,) or by seed drill
some, and covered by a one-horse plough. The culture demanded is a scr
harrowing to loosen the crust as they are appearing above the ground.
is followed, when the peas are a few inches high, by a horse cultivator,
back teeth of which should throw the earth towards the young plants.
process is repeated when the vines have grown to 6 or 12 inches high,
which they will take care of themselves until they are ready for picking
sale. The practice of ploughing towards the plants is less in vogue
formerly. The kind of seed sown is the growth of the district, caref
selected, and of long understood qualities for earliness and productiven
Such seed has sold as high as $20 per bushel. Dan O'Rourkes have
planted, but were not so early the first year, growing too rank; but
growth of the second season was as early as the ordinary varieties. An e
pea grown in Canada is planted by some with good success, northern-gr
seed having generally an early-growing quality. The peas formerly grow
Virginia for our markets were raised from seed the product of Ca
county. Peas are planted by the best growers expressly for seed, no
being taken therefrom for market, experience having proved that those sele
for seed from the earliest ripening pods will prove the earliest to mature
following year. The early pea may be planted or sown in the autumn, an
sometimes thus early committed to the earth in the more southern countie
this State, but we are not aware that any advantages result therefrom w
are not counterbalanced by the loss caused by mice and decay in the gro
They are said to appear ten or fifteen days earlier, but they are thin in
rows, and the practice of fall planting is not encouraged by the results. F
the 1st to the middle of May the early pea will be in bloom, and the ear
pickings ... been from the 16th of May to the 18th of June, or a
three wee... blooming. The demand for early peas to su
... Phila... markets is very large. The high prices
... the craving of the good citizens of the
... Nearly 5,000 barrels of early peas have
... New Yor... in one season, most of which were
... picking was received in 1864, at Cam
... three barrels only; on the following
... daily receipt and shipment ranged
... then seventy barrels were despatc
... to upwards of 325 barrels, or ne
... declined until the 6th of June, when
... In 1864 there were forwarded to New
... barrels, or nearly 7,000 bas

urly peas. More than 1,000 barrels daily have been taken to New York from he way stations in this district. The first picking has commanded at Camden for several years past, from $1 to $1 50 per basket, containing five-eighths f a bushel. Three and a half baskets will fill a barrel, and the early growers ave received from $3 50 to $6 per barrel. The latter highest price has been d only since the competition from Norfolk has been destroyed. The price apidly declines, sometimes at the rate of a dollar a barrel daily, until they oon are not worth the cost of picking, which is from fifteen to eighteen cents er basket. The value of shelter by belts of evergreen trees is well known to growers of early peas. Plots, of which we have knowledge, thus protected rom the northwest and northeast, have returned to the grower more than others of five times the same extent, similarly treated and planted at the same time, because of their early ripening by but two or three days in advance. The second crop of peas is obtained from the "Marrow-Fat." These are planted in very sandy ground from the middle of March to the 1st of April, and are ready for picking when the early peas have disappeared from the market. If very early they may bring the grower $1 per basket, but generally not more than 75 cents, and decline soon to 40 cents or lower. They are, of course, sold only in Philadelphia. The early peas are often planted in drills five feet asunder, and the intermediate space reserved for cucumbers. By this course of cultivation and reservation for a succession, four crops may be taken from the ground in one season. Thus when the peas have grown to the height of four or more inches, and need no further working, cucumber drills are made intermediate, and seed planted as usual. When the peas have been removed, the cucumber vines occupy the space thus made vacant. After the last cultivation of the cucumbers the drills formerly occupied by peas are planted with sugar corn, which will have attained some growth by the time the cucumbers have ceased to repay gathering and conveying to market. The vines are then immediately removed, the corn cultivated, and when this has been done for the last time, the space made vacant is sowed with turnip seed broadcast, (generally with the purple top flat white variety,) which continues to grow until late in the season. A few years of such treatment may prove exhausting despite the heavy manuring practiced, and it is esteemed both restorative and economical to sow clover seed upon such land, cut one crop, and again plough under, either for early potatoes, corn, or the round of trucking as above, or for tomatoes alone. Superior crops of rye are sometimes grown on land thus "trucked," or on which sweet potatoes have been grown for several years.

ASPARAGUS.

While the peas are growing, the asparagus has made its appearance, sometimes as early as the first of April, but generally about the 20th, in this district. This plant is a fixture, occupying the entire ground for many years, and producing, under judicious cultivation on soil well adapted to it, very large crops or a long succession of seasons. It, however, eventually declines in productiveness, and becomes an undesirable tenant, (not "at will," but an "entailed" possessor,) so difficult is it of eradication. A successful grower of asparagus in Camden county has described his process as follows, which appears to be satisfactory for field culture: Late in March select a light sandy loam, free from s and grass, for the site of the plantation. With a one-horse plough draw ws four feet apart, and follow with the largest two-horse plough, repeatedly ing in the same furrows. Follow this with shovels, and remove the loose n to the depth of sixteen inches, throwing it into ridges between the furrows. d the best stable manure in the furrows to the depth of three inches, and on place the roots, which should have grown two years in the seed bed. ced twenty inches apart upon the manure in the trenches, they will con-

tinue to yield longer than if more closely planted, as the roots in time become, by the formation of offsets and new crowns, inextricably complicated and interlaced. The plants are lightly covered with a hoe by drawing the top soil upon them. The half-filled trenches should be kept free from weeds, and the next season, if the plants have well grown, it may be filled even with the former surface. In the spring of the third year the young shoots may be partially cut for market, care being observed to retain a portion of them for the healthy growth and due vitalizing of the roots. To obtain the strongest and earliest growth, stimulating applications are useful; and for this purpose night-soil with a proportion of salt is a specific manure. This, however, is seldom applied by the market-gardener on a large scale. The roots from old beds about to be destroyed have been very profitably used to obtain a forced growth. The very high prices which asparagus commands in the New York market, in January, February, and March, render this a profitable mode of disposing of the old roots. By planting a succession every six years, and using the old roots when worn out, a constant supply of plants for this purpose may be had, while the newer beds will furnish the crop in its season. The tenderness of this vegetable depends much upon high manuring and its rapid growth in a warm soil. In many parts of the north of Europe asparagus is forced in the beds themselves without disturbing the roots. Trenches are dug beside the asparagus and filled with hot manure, and the beds covered with the same material to the depth of six inches. In very cold weather the beds are covered with frames. Asparagus thus treated is neither stringy nor tough, but tender and succulent as in its proper season. Such treatment, however, enfeebles the plants, and to restore them to their former strength they must be permitted to grow, without cutting, as freely as possible during the succeeding summer. Some localities produce better results in asparagus growing, despite the manure used, though no giant growth can be obtained without profuse enrichment. On Coney Island, on the south side of Long Island, near New York, asparagus is grown of extraordinary size and delicacy, and epicures have resorted to this locality to partake of the luxury of spears of over an inch in diameter, and so tender as to be edible a foot in length. The presence of salt in the soil is of importance—indeed, indispensable to mammoth growth, and may be spontaneously supplied at Coney Island. Asparagus raised on the sea-shore in northern Spain greatly surpasses our product, as also does that of the London market-gardeners, who produce heads three of which will weigh a pound. The Spanish asparagus is stimulated by the drainage of sewers flooded over the salt sea sands whereon it is grown.

The large growers of asparagus cut it daily for the Philadelphia market, using a knife adapted to the purpose, chisel like, with a long shank or handle. The young shoots, which have just protruded their green or purple heads above ground, are removed from the crown of the root by cutting several inches beneath the surface, to obtain the delicate blanched and succulent growth. T are prepared for sale by arranging them into bunches of about one pou The shoots, having been cleansed by washing, are placed before the o a table having a front ledge of six inches in height, and a series of ranged by fours, for the reception of the piles of shoots. Between the is arranged a semi-cylindrical iron plate, with the concavity upwards, which the shoots are laid, their ends in contact with the front ledge. O bunch, as piled to the proper height, a strap is placed, which, passing the table, is tightened by a spindle or ratchet turned by a crank. Se these cylinders, strapped, &c., are arranged upon the table, adapted to of different lengths. When tightened, the strings, which had previ placed beneath, are tied, the strap is relaxed, the buts cut smoothly, bunches are ready for market.

In March grass-seed and clover-seed are sown; timothy (*Phleum pratense*)—the herds grass of New England and New York—is, however, generally sown

ie autumn on the wheat. Planting the early peas may continue for a week iore as the weather and the ground will permit, as both are at this season · variable. About the last of March or first of April ploughing has comced for oats by the few farmers who grow them; their place in a rotation amden county is commonly supplied by white potatoes.

EARLY POTATOES.

loughing has, however, commenced about the middle of March, or earlier ie season will permit, on ground sufficiently dry. The more sandy ground nded for sweet potatoes is sometimes turned in February; that for white itoes is not generally fit for the plough until later, though the earliest ieties are sometimes planted by the 17th of March, or the day dedicated 'Saint Patrick." The corn stubs are knocked over by careful farmers while ground is frozen, and are then easily buried by the plough. Others grub m out and cast them to their cow-yards, or waste them in filling gulleys. The und is ploughed thoroughly but not deeply for white potatoes, (six inches ng the average,) and furrows opened for drills two and a half to three feet irt, according to the strength of the variety to be grown. One of the most licious and successful growers of white potatoes in Haddon township cultices sundry varieties which ripen in succession. Each kind may thus be omitted to the ground and digged in its turn, without encroaching one upon ither, or too much hurrying the labor required by each. The manure applied potatoes is that of the horse-stable and the cow-yard, composted with "green id marl" in the proportion of four loads of the former to one of the latter. is compost is applied at the rate of thirty one-horse cart-loads to the acre. small portion of fallen lime has sometimes been thrown upon the heaps nediately before applying the compost, with advantage, it is believed, to potato; being immediately covered, its otherwise injurious effects may be iided.

The mode of planting found most convenient to insure a proper succession of ing and digging is as follows: The earliest variety, the Michigan White outs, are dropped upon the manure in the furrows, about two and a half feet and fourteen inches in the drill, the sections being of good size, having one more eyes. Larger cuttings are deemed desirable for the production of a ng, early growth, and earlier maturity. Next is planted the Buckeye, which ives the same treatment. The Dykemans are next in order, followed by a ety which has received the popular name of "Monitor." This is a very protive kind; under good treatment 30 bushels of seed having returned 507 iels, 185 of which grew on three-fourths of an acre, (or at the rate of 250 iels per acre,) in 1864.* These "Monitors" were grown in drills two feet inches apart, and fourteen inches in the row. The fifth in the series are Peach-blows, which, from their strong growing habit, require drills three feet t and from fourteen to sixteen inches in the row. The last variety completes series, and is committed to the earth about the last of April or early in May, may continue to grow until frost has destroyed the leaves. The cuttings ted for a late crop are placed in the furrow and the compost thrown upon i; for early crops it is deemed advisable to place the cuttings upon the ma-, that it may earlier receive the influences of the spring sun. A short time re the sprouts of the potato should appear the ground receives a harrowing, vel the tops of the ridges formed by the closing furrows which have covered lrills. When grown sufficiently to bear cultivation, they sometimes receive ughing, by which the earth is thrown towards the row, but generally level

* nother grower of early potatoes has produced from sixteen baskets of seed, of the White it variety, 600 baskets of merchantable potatoes, which were sold early in July at $1 25 asket, or $725.

[illegible]

[illegible] region of [illegible] and northern Pennsylvania. His success is the result of thorough culture and early seeding upon a soil not naturally adapted to the growth of heavy crops of wheat. His crop for 1864 returned [illegible] bushels or [illegible] bushels per acre; that of his neighbors generally did not produce one-half this average, that for the entire county having been but thirteen bushels. An instructive lesson may be found in the above recital of successful wheat culture that should stimulate others to greater care in the preparation of the ground and to early seeding for this important staple.

RHUBARB.

Early after frost has left the ground and a moderate warmth has penetrated it, the rhubarb makes its appearance; its leaves unfolding as if by magic. In this latitude its first appearance may be from the first week in March to the middle, or later. By the 10th of April the leaf stems are oftentimes sufficiently grown to be fit for market. These stems should be about ten inches long below the leaf before the pulling should commence, and, as the season advances may be permitted to extend in length. To remove the leaves properly they should be grasped separately, as near the root as possible, so as to secure the entire length in perfect condition. The leaves, as they are gathered, should be placed in small piles, and, as soon as may be, removed from the sunshine to shelter, to be "bunched" and put into merchantable shape. This is a very simple process, but may be described as follows: Place the leaves upon a high and large table, before which stands the "buncher," who collects the leaves of uniform length to

›ne bunch, (less regard being paid to thickness,) to the number of four to ı, as size or custom may indicate. Holding this in his left hand, the ends e even by a slight tap against his body, it is placed in a rack on a small ıe, where it is kept in position by pegs or pins three inches high, before and ıd which strings had been previously placed by boys, who at once tie it as ıt as possible, and then cast it over to a fourth assistant. who washes and trims ınd places it in a pile ready for the market.

In this manner four persons can pull and bunch five hundred bunches in a y. That which is gathered in the afternoon should be taken to market the t morning, thus securing its freshness, and avoiding injury by heating, to much it is liable when closely packed. Early in the season but a small portion r none of the leaf should be removed: but later, as the stems become longer, y must be more closely cropped, which may be done by one or two quick okes with a sharp knife. The stem-ends should not be cut unless broken or ed. The varieties of rhubarb under cultivation are numerous, and various quality and early fitness for market. That known as Myatt's Linnæus is at nt most esteemed, and is grown from sections of the roots having one eye ›ud.

The process followed on a large scale in this section may be thus described: A deep rich loam is the best soil for the growth of rhubarb, though it will w in any kind of soil if drained and properly manured. The ground ted should be mellowed deeply with a two-horse plough, and if the sub- ›e hard it must be also broken up. Divide the plot by furrows accurately, feet each way, and at each intersection remove the earth, making a square a foot or more wide and fourteen inches deep. After two rows are thus ared, into each hole throw a forkful of good stable manure. If the ring be delayed until all the holes are made, a cart cannot pass over the l. The manuring thus accomplished, drop a section of the roots to be ted near to each hole. One assistant should hold the root in the proper e of the rows, the crown being at the depth of two inches beneath the level surrounding soil, while another throws in sufficient earth to hold it in its position. The hole should then be filled up and the earth trodden solid at the plant. No leaves should be removed from the rhubarb until it has d one year's growth. If planted in the autumn a stronger growth may e obtained than if put out the following spring, and may prove more re- munerative.

After the crop is established, manure broadcast every fall or winter with at least a one-horse cart-load of stable manure to every hundred hills. Peruvian guano may also be profitably sown over the ground in early spring. The cul- tivation deemed necessary is performed in early spring, as soon as the weather will permit, by passing a cabbage plough along the rows as near as possible, throwing the furrow away from the plants, running as deep as the roots will . This should be done in both directions, and the ridges smoothed down y the hoe-harrow, and repeated when requisite. After the leaves have ex- the hoe-harrow or cultivator will alone be needed for keeping the clean and mellow.

arb, planted at the distance of four feet each way, may be expected to rly for four or five years without resetting, which is necessary when e ts appear to decline. To obtain a succession of prime growths it is to have a portion of new ground planted yearly, and as much cleared of ı have become unproductive. The old ground may, however, be d; ı old beds may be partially renovated by dividing the crowns s ı, and removing one-half and permitting the other to remain for one two ʒ loı r. The blossom stalks which appear from time to time be ly broken out, for if left to perfect themselves they w ı diminish the productiveness of the parent plants. ˥

leaves should never be entirely removed from a rhubarb plant, as it wo injured by total stripping. Commence on one side of the "patch," and from a portion only of the rows each day. A better article will tl secured, and the plants from which leaves were removed on the first da have an opportunity to recover in readiness for a second contribution. the middle or end of May no more leaves should be taken from the plant their summer growth may prepare them to endure the gatherings of th year. If planted at the distance of four feet, an acre will contain 2,722 and, if well managed and near to a good market, should produce an a clear profit of $200 per annum during the five years it is in high pro condition. But so variable are the demand and price that no definite is certain, and so prolific is the nature of the rhubarb plant that any ı may be easily overstocked with its product. Late in March or early in the tomato plants are removed from their seed-beds and "spotted" out extensive glass structures or "cold frames," where they are planted abo inches apart upon a good soil enriched with old manure. Here they ı careful nursing and sheltering from the cold and changing skies and rain they become large and stocky, and the weather has become warm and s which is generally about the 1st of May. The plants are then carefu moved and planted in a light loamy soil, in hills about six feet by f apart. In each hill a small shovelful of well decomposed stable manure, or post of four-fifths manure and one-fifth street-dirt, has been placed. If in drills the entire length the results are by some deemed better at the ı fifteen or more one-horse cart loads per acre. The tomato plants are ca serted deeply either by a dibble made of an old fork handle sharpene point, or by thrusting the hand forcibly into the soil. Very deep plan approved, as new roots are thrown out nearer the surface, and the pla comes more robust. Clean cultivation with the horse-hoe or cultivator needed until the vines have become so large as to impede the work. A early ripening may be hastened by removing the upper part of the plan the first and lowest tomatoes have set and obtained half their size. The half-grown fruits soon enlarge rapidly, and ripen earlier than if the who had been retained. From 200 to 500 baskets of tomatoes may be raised on one acre, on soil adapted to their early growth, and in sh localities, or where shielded from late frosts by the influence of water. are brought into market as early as the last of June or first of July, a readily sold at very high prices. A skillful farmer in Gloucester county Jersey, received in the summer of 1863 sixty-six dollars for seven basl four and three-quarters bushels. In the summer of 1864 the same gro tained twenty dollars for two baskets, the earliest in the market; other dent on "Pea Shore," received five dollars per basket for their tomato the same district of Stockton this vegetable is extensively grown, and fr favored location and early ripening large sums are realized therefor. 5,000 baskets, raised by one of these successful "truck-men," retur 1864, more than $3,000. That season was, however, unusually favor respects product, demand, and high prices. Another skillful cultiva tomatoes grew about 8,000 plants on less than four and a half acres, product of which he received upwards of $1,000. His earliest gatheri made on the 2d of July, and for these he received $5 per basket, and first hundred baskets, which were gathered in about ten days from tl ripening, $4 25. The second crop of tomatoes is grown from plants o from seed sown in drills in the open air. The large smooth red and the are popular. The season is oftentimes cut short by frosts early in or n middle of October, and vast quantities of the fruit destroyed. If gath anticipation of frost, and placed beneath glass on straw, a large propor those half ripened may be secured and partially matured for market

-plants receive a treatment resembling that given to the tomato, but areful nursing is demanded while in the seed-bed. Some growers have them highly profitable, one of the most successful in Camden county ; sold 600 baskets, the product of three-quarters of an acre, for $400. ie earliest product he received $3 per basket, and the entire return was round rate of $567 per acre.

THE SWEET POTATO.

ut the middle of April the preparation of the hot-beds for starting the potato, for the production of sprouts, is commenced. Much of the soil of itrict of New Jersey is adapted to the growth of this admirable root. No northern State produces the sweet potato so abundantly or in as great tion. Her product in 1860 was more than one million bushels, which equalled that of all other northern and western States combined. In the Agricultural Department estimated the growth of the sweet potato in Jersey at 1,634,832 bushels, valued at $1,226,126. The crop of 1862, estimated, surpassed all other northern and western States in aggregate it. Most of the southern States greatly surpass New Jersey in the t of product, North Carolina and Georgia having produced in 1859 more 5,000,000 bushels each, Alabama 5,000,000, sundry others from two to millions of bushels, where it appears to be the great staple vegetable it. Though adapted to a warmer climate, it attains in our State, in ble seasons, a degree of perfection which leaves nothing to be desired. season was that of 1864, which was remarkable for its product, both in ty and quality, and for remunerative prices. The return of this crop from 100 to 200 baskets and upwards per acre, the latter being an exgly favorable yield. From six and a half acres there were taken in 1864 baskets, which sold for $1,700. Upon three acres 800 baskets (or 500 s) were raised, which sold for $1,000. On two acres 600 baskets (or ishels per acre) were produced in 1864, which yielded per acre about gross revenue. The above is not, however, a fair exhibit of regular returns for the anxious care, the labor and expense, which is sometimes remunerated by an indifferent crop and diminished prices.

iccessful grower has favored us with his method of culture, which we do better than give entire for the instruction of those who may wish to te this choicest of esculent roots. Moderately good sweet potatoes may ed further north than New Jersey, on a warm soil, and large crops have grown in northern Pennsylvania, where we would not have deemed could be obtained. The product was not, however, commended to our y that flavor and dryness which result from growth upon a properly d soil, under a warmer sky. The sweet potato requires a sandy soil or y loam. Land is generally chosen which has been in corn or a vegetable ie previous year, though it is a common practice to plant the same with sweet potatoes season after season. In the latter they seem to s well as they do in freshly chosen ground. Having been ploughed as ordinary crop, but not deeply, the ground is furrowed out with a onelough three feet each way if to be planted in hills, over three and a half art if in rows, the plough running twice in the furrow. A forkful of table manure is then, if for hills, placed at each intersection of the fur-1 well covered by hand with a hoe. If to be grown in rows, the is scattered evenly along the row and covered by turning two good directly upon it. The field is then ready to receive the plants. The should be applied freely, and be of good quality. It should have been rked over until fine and mellow, to avoid as much as possible increasing l effects of drought by presenting to the plants their food in lumps,

which readily become dry and unavailable, and which, if once in that condi tion, will certainly remain so throughout the season. When grown in rows a larger number of plants are required than when grown in hills. Both method have their advocates, but if the sprouts are placed from twenty inches to tw feet apart in the row a better crop is generally obtained for the same amoun of labor and money expended. The young sprouts or plants are grown from "seed potatoes," selected from the previous year's crop, which should be of middle size, and of short, compact shape. These are placed in hot-beds, made up from about the first to the middle of April, in the ordinary way. The manure, fresh from the horse stable, having been evenly shaken into the bed or frame to the depth of twelve or eighteen inches, is pressed down by the weight of the laborer upon a board laid thereon. The board is removed, and the whole evenly covered with about three inches of rather dry sand. Upon this the "seed potatoes" are carefully placed, close together, though not actually touching, and are then covered with about three inches of good sand or loam. Great care is observed that the right degrees of heat and moisture shall be maintained. If the heat become too great it may be checked by piercing through the bed into the manure with a rake-handle, thus allowing the excess of heat to escape. Moisture must be regulated by the watering-pot, which should be used on clear days only, and about noon. If the heat or moisture become excessive, the potatoes will rot; deficient heat with moisture may cause the "black-rot." If the plants become infected with the latter, it will prove worse than useless to endeavor to use them. Heat and dryness kill the sprouts, or prevent their growth; and even when moderate dryness is combined with other influences favorable to growth, though sprouts apparently good may be produced, they will not possess well developed fibrous roots. Experience alone can teach that wisdom in minutiæ which will command certain success. The bed should be exposed to the sunshine on every clear day, and covered with hay or straw at night, and in rainy weather protected from excess of moisture by a covering of boards. The sprouts will be ready for transplanting in about a month, and planting commences from the 15th to the 22d of May, and continues from two to four weeks. When the time for removal has nearly arrived, the plants should be exposed to the open air, to harden them for the field. The sprouts are drawn by taking hold of but one at a time, and gently extracting it in order to avoid disturbing the mother potato, from which, if undisturbed, a second crop may be obtained. A bushel of good seed properly managed will produce 1,200 or 1,500 sprouts at the first pulling, and three-fourths as many at the second. Those obtained later are often as good as the earlier growth.

Good, strong, stocky plants having been obtained, they are rapidly and expertly transferred to the soil, the operator using no implement but his bare hand. Dashing aside the crown of the hill or ridge, he thrusts his open hand into the yielding sand, and with the other inserts the plant, covers and compresses it, and if the ground is too dry, waters it. In a week or two the field must be examined and replanted wherever cut-worms or other insect larvæ may have destroyed the first setting. Clean culture, with the hand-hoe or iron garden rake and horse cultivator, is now required until the vines have covered the ground. About the middle of August the ground should be "tended" for the last time, by ploughing to the rows or ridges, and cleaning up the balks. To perform this thoroughly, the vines must be loosened from the soil to which they have attached themselves by small roots along the main stem, and turned over or out of the way by means of sticks or by the hand. Before gathering the crop, the vines are cut off close to the hill with a sharp hoe. The potatoes are then ploughed out and thrown into rows to dry, when they are readily sorted for market.

To fit them for preservation they must be lifted before the weather indicates a degree of cold sufficient to freeze the ground, or, in this latitude, before the

5th of October. Those intended for winter storage should be gathered before ie middle of October, put up in barrels or shallow boxes, and placed in a dry, arm situation. When placed in barrels in the open field, and carefully handled, they will be more readily preserved during winter, other circumstances eing favorable—slight bruising from rough carriage proving injurious to them, : designed for winter use. When large quantities are reserved for spring sales, ouses are erected expressly for their preservation. These are generally two tories high, built of wood, and so arranged that the potatoes may be stored herein in boxes about two feet deep, placed in tiers, with spaces of a few inches between for ventilation, and extending from side to side of the house to within a foot of the weather-boarding. The source of heat is a fire in the cellar, from which the warmth is caused to circulate equally and freely throughout the building. Thus arranged and carefully tended, maintaining a nearly uniform moderate heat, sweet potatoes may be preserved until late in the following spring. No chaff, shavings, or other material is needed; careful packing and handling, and uniform moderate heat, being the only requisites for the attainment of perfect success in the preservation, for the entire season, of this admirable root.

CUCUMBERS

Are sometimes successfully grown in cold frames, covered in cold weather by sash, and exposed at all times in warm or fair weather. Seeds are placed in a piece of inverted sod about four inches square, and arranged side by side in a low frame, having a back of but four inches, to prevent excessive growth from reflected heat. Seed sown in this manner about the 20th of April, and duly sheltered and exposed to the air at proper times, will be ready to set out by the 15th of May, after which they will require shelter from late frosts. Cucumbers are now grown in drills or rows about five and a half feet apart, the plants being three feet asunder in the row. The manure, which should be well rotted, is sprinkled along the furrows, in preference to more condensed manuring in hills or beneath each plant only. A most successful grower of early cucumbers, whose practice of early forcing the plant, or rather of protecting it in its infancy, is that described above, has thus picked fine full-sized fruit, to the amount of many baskets, as early as the 28th of June, for which he received, in 1864, seven dollars per basket. The ground upon which these early cucumbers were grown was exposed, having no shelter from the north or northeast.

LATE CABBAGE.

The cabbage crop is a very important one in Camden county, where it receives the cultivation it requires to command success. The past season was unusually favorable to its growth, heavy crops, at compensating prices, having been obtained. Upwards of 20,000, by one grower, were raised on four acres, which sold for about $1,500. More than 40,000 were obtained by another most successful grower from about eleven acres, which returned a gross sum of nearly $3,300; and a third produced, on thirty acres, 175,000, which were sold for $9,000. The season of 1864 was exceptional in the product and profits of this crop. Whole fields sometimes refuse to head, and the care and expenditure for labor and fertilizers, which are heavy, are, in great measure, lost. The ill success of many who would grow this important vegetable may be oftentimes found to arise from their indifference to choice of seed and injudicious culture, rather than from the season. This may appear more clear by a description of the method followed, with almost uniform good results, furnished by one of our most intelligent and enterprising young farmers. His paper we will give nearly entire, the result of experience on a large scale.

"Having experimented in cabbage-growing, on soils varying from a light sand

to a heavy loam, we find that a medium rather sandy loam will give the best success. But whether the soil be light or heavy, the indispensable elements of success are, carefully-grown seed, a high enrichment, and thorough cultivation. We have been in the practice of sowing the seed about the 5th of May; have delayed it until the 20th; but the sooner the seed can be started and grown to sufficient size to escape the ravages of the cabbage flea, (*Haltica striolata*,) the better. There are two methods of preparing the seed-beds, in each of which we have been successful in growing good plants. The variety most esteemed for winter consumption is the drum-head. Select a piece of dry, sandy ground, spread thereon guano at the rate of five hundred pounds per acre, and plough or spade it in shallow, then harrow and rake smooth, producing a fine mellow soil before planting. Take a board eight inches wide and about twelve feet long, having straight edges on each side. Standing on this board, draw a straight drill along each edge with a spade or trowel, and sow the seed along it as thickly as may be deemed judicious, erring rather in excess than otherwise. Shift this board along the seed-bed, repeating the process of drill-making and sowing, as described. We have planted cabbage seed with good results by manuring the ground in drills three feet apart, ridging with a plough, smoothing the surface nearly level with the surrounding soil, and then planting in a broad band thereon, and covering lightly with earth. This latter method permits horse cultivation, but in neither case must the earth be suffered to become hard or weeds be allowed to grow among the plants.

"The great difficulty to be overcome by the grower of cabbage plants arises from the ravages of the flea beetle. This pest sometimes sweeps whole beds, attacking the tender plants as they break through the ground, and continuing to feed on them till the second leaf is well developed. To prevent this evil, and destroy the pest, we have tried soot, sulphur, guano, ashes, a coop with hen and chickens among the plants; but the remedy has, in most instances, proved worse than the disease. The last has, however, in some instances been successful; though, as the chickens became large, the cabbage plants became, in turn, a prey to their insatiable cravings. With all the care taken the seed-beds will at times present a sorry appearance, and afford but an indifferent supply. It is safer to make two plantings, even if side by side, ten days or two weeks apart, the latter planting frequently proving the only source of supply. By the 10th of June the plants should be growing rapidly, and stand three or four inches high, with strong stems, ready to pull and set out. Meanwhile the ground selected for the crop has been thoroughly ploughed and furrowed into drills three feet apart, with a one-horse plough, going twice in each furrow. If the soil is not already in "excellent heart," a liberal supply of well-rotted manure is spread along the rows and covered at once. If the soil be in good condition guano is applied in preference, and is spread along the drills at the rate of from 200 to 300 pounds per acre, and covered. Guano stimulates to early and rapid growth, and appears to be the specific manure for this vegetable. The entire field having been prepared in this way, poles are set up, and a marker (made of five half-inch slats placed edgewise and parallel, 2½ feet apart) is drawn by hand to and fro across the ridges covering the furrows, making five lines at each traverse over the breadth of the field. After the first tracing has been made the poles are dispensed with, one runner of the marker returning in one of the lines previously made. The tracing across is sometimes made by lines three feet asunder, which throws the field into squares of three feet, requiring 4,840 plants to the acre. If marked or laid out as described, 2½ feet by 3 feet, 5,808 will be needed for planting each acre. The latter mode is rather preferable, as the distance is sufficient, though the plants finally entirely cover the ground, while nearly 1,000 more heads may be taken therefrom.

"When ready for planting, and the ground in proper condition, just after a rain, e plants are pulled and carefully packed in baskets. A boy precedes two

ɪen, his basket strapped by his side, and can readily drop for them, one to each urrow. Taking the plant in the left hand, and dashing aside the crown of the ge with the right, which is then plunged into the soil, the young cabbage is :rted nearly up to the leaves, and the earth lightly pressed around it. Plants n from a sandy seed-bed are furnished with a mass of fibrous roots, which ribute greatly to growth and ability to withstand the sunshine while taking root in the soil. If the weather be dry, and no rain in prospect, a pint of :r poured around four hills will prove sufficient, in most instances, to sustain ınd induce growth. It is desirable that the leaves of the plant should start us: to the ground as possible, and that they be regularly planted to secure ration on all sides. The after treatment is very simple; a horse hoe, or ator being used to keep down the weeds, and render the ground mellow. ;es must be kept growing from the time they are set out until perfect are formed. If they receive a check from weeds, or a hard surface-soil them, they never recover therefrom. Constant vigilance is, therefore, .ed to keep in action their growing energies. By the first of October the ɛaɪ should be closing in rapidly and forming heads. The more forward will nue to grow, will burst and "go to seed" if care is not taken to pull each advanced sufficiently to break its roots slightly. A slight crack on the op oɪ the head indicates over-ripeness, and further advances may be thus revented.

"Before any cabbages have been cut for market the field should be searched horoughly, and a selection made of plants for the production of seed, which hould be marked by a stake inserted beside them. This selection must be ıade with great care, and the parents of the future generations of cabbages ɪould stand upon short but not too thick stems, with dense, hard, and well-eveloped heads, having fine soft veins, and but few spare leaves around them. hose intended for seed should be pulled up just previous to burying the main op, taken to a dry spot and laid on the ground, their roots upwards and to-aı one another, forming a semicircular pile, the heads pointing outwards. pile is completely covered with earth to the depth of eighteen inches, a neavier on the northern side, which will preserve them unharmed in this ıtude throughout the winter. The crop may be cut and carted to market any ne previous to December, as they are injured by freezing and thawing, but ill withstand a continuous frost without much apparent injury. By the last of ovember, or first of the succeeding month, preparations should be made for ying those intended to be sold during the winter or following spring.

-Three rows of cabbages are pulled up the entire length of the field and placed one continuous line, lying on their sides, the roots pointing towards the furrow out to be opened. With a two-horse plough open a drill, returning in the same ı and deepen it. The workman standing astride the furrow, with his left .ws the cabbage into the furrow, head down and roots out, and tucks eaves under and around each one before passing to the next. The entire ıa is thus planted, while the covering is quickly performed with a one-horse ı by throwing a furrow just sufficient to cover the cabbage on each side, the roots exposed. A covering of but two inches affords ample protection, s their ready extraction as well as thawing during an "open spell."

'Those who would command success in cabbage-growing on a large scale, l select the heads and grow the seed for themselves. If compelled to buy, y cannot inquire too closely into the integrity of the parties selling, and their d of raising seed. Seed grown from stalks after the removal of the head, bage which did not (and perhaps never would) form a head, will dis- grower of this crop. Unscrupulous seedsmen will sell such seed, ; ıt to have been thus raised; though plants grown therefrom must be ,and ll surely cause vexation and loss to their cultivator. Complaints are heard every season, and the dishonest practices of

dealers who would palm off such worthless trash, called seed of their growing, should be severely exposed."

STRAWBERRIES, RASPBERRIES, AND BLACKBERRIES.

If we would believe the reports that are so sedulously put forth by entl imaginative, or interested writers for the agricultural journals, we should ŧ that fruit-growing is uniformly a productive business in the district of whı treat. But this is far from the truth. So far from being uniformly pr the product is on the decline, and the business has been abandoned by farmers. Entire orchards have been rooted up, not because, as some woul us believe, the owners did not give their trees judicious treatment, pruni but because the crop is too precarious. A heavy crop of apples, occurrin in eight or ten years, will not satisfy the owner of broad orchards, spr their shade over everything beneath, and unfitting the soil for any othe The farmers of Camden county cannot afford to raise winter-keeping app the shade of the trees costs more than the crop is worth. So long as w New York, a region adapted to fruit-growing, can supply apples in unl quantities, we will not occupy with orchards land worth from $200 to $4(which will pay exceedingly well if cropped with market-garden vegetabl small fruits. Our own orchard of twelve acres of prime trees has not b fair crop of fruit for eight years past, nor have we had from long rows of varieties one apple that could be esteemed excellent. The early summer appear to be productive in some instances, and are worthy of more atten sheltered locations.

Enthusiastic writers, who judge of the fitness of a district for fruit-ra the returns for one season, which is exceptional, have praised our distric high excellence in this respect. Such, however, is not the case. Wester Jersey is not well adapted to the growth of winter apples or pears, thougl sionally large crops of good fruit are raised. We are satisfied that much may be done by this indiscriminate praise of the district, and that some r induced thereby to expend means and labor upon a business that must as it has again and again proved, unremunerative.

In the production of small fruits, such as strawberries, raspberries, and berries, we doubt whether the river townships of Burlington county hav surpassed. The following reliable returns and statistics will exhibit the productiveness, and profits derived from this business, which will probab to the surprise that some readers may already have felt in scanning the ve wealth of "poor Jersey."

In the immediate vicinity of Moorestown, Burlington county, New there were grown in 1862 more than 6,000 bushels of strawberries, v the moderate rate of $3 50 per bushel, produced a return to the farmers vicinity of at least $20,000. On ten days an average of 600 bushels a da on one day 700 bushels, were carried to Philadelphia, from this neighb alone, by one avenue to market. Large amounts are taken to the san from this district over other roads and by water conveyance, and to Nev by rail. The quantity thus seeking a market probably quite equals that named in amount and productive returns; and we doubt not that fro small district of a few square miles 12,000 bushels were produced, and r to the skillful growers upwards of $40,000 in the year 1862. One farmer, strawberries are sent to New York, devotes forty acres to this crop; and received for one day's picking, sent to that city, $300. Two hundred bushels of strawberries have been raised on one acre, which sold at nine per quart, realizing $600.

By the reports made to the West Jersey Fruit-growers' Association, in from the townships of Burlington, Chester, and Cinnaminson, all in Bur

ıty, there were under cultivation and producing fruit, during the preceding on in said townships, 272 acres of strawberries, 40 acres of raspberries, and acres of blackberries. Of the above 272 acres of strawberries, 200 were prised in Burlington, 47 in Chester, and 25 in Cinnaminson. The aggregate luct was 12,596 bushels, or 403,072 quarts, and the amount received there- $45,345. The general average yield per acre was 55 bushels, viz: in Bur- on 40, Chester 68, and in Cinnaminson 56 bushels. The average price d was $3 60 per bushel, or 11¼ cents per quart, which is 50 per cent. ater than for five years previous.

[above is much below the possibilities of strawberry production. One ually large crop of Hovey's Seedling and Lady Fingers was reported from ester, which returned from 1.46 acres 8,000 quarts, or at the rate of 166 h per acre.

second annual report of this useful association, which should be more rously patronized by the horticulturists of the district, whose interests it st greatly advance if but properly aided and encouraged, contains more of the progress of small-fruit cultivation in our midst. But four town- reported in 1865 an area under cultivation in strawberries amounting to acres, of which 220 were in Burlington, 200 in Beverly, 40 in Chester, and in Cinnaminson. The total product of these 488 acres in bearing was 27,924 els of fruit, yielding the sum of $164,633. The general average product acre was 58½ bushels, and that for Burlington 40, Beverly 75, Chester 65, Cinnaminson 54 bushels. The average gross sum obtained per bushel was ut $5 90, which is a very large increase over that for 1863.

A general progress is apparent in the extent of cultivation and productive- s. But occasionally crops have been raised three times as large as the gen- l average reported above. Seventy bushels have been raised in the township Cinnaminson upon one-third of an acre, or 210 bushels to the acre. The mium crop of 1855 yielded 1,052 quarts on twenty rods of land, being at the of 263 bushels, and yielding more than $1,200 per acre, after deducting ry expense for manure, hoeing, picking, sale of fruit, and interest on the d. Cannot such crops be frequently or regularly raised? And what was t combination of favorable influences? And can they not be again com- ided, and that upon a large scale?

Such extraordinary returns should serve to stimulate fruit-growers to inquiry the causes which have conspired to produce these magnificent results, which doubtless be again obtained. That moderate crops continue to be grown icates that some radical error exists in the common mode of cultivation. The mittee on fruits, reporting to this association, asserts that thorough prep- tion of the soil before transplanting is of the first importance; that the ground ld be deeply ploughed in the fall, and liberally enriched with a well-prepared post; that much closer attention should be paid to the adaptation of varie- to the peculiar soil to be planted; and finally recommends more thorough ration in the beds, to admit of which a more systematic distribution of the s and removal of a large proportion of the minor growths should be prac- d. The mode of cultivation almost universally adopted is to plant in rows feet apart, and one foot in the row. The vines are trained across the beds, set in as they are ready for forming roots. Beds three and a half feet wide thus made, and a path eighteen inches wide is formed between them. Thus d, on ground deeply ploughed and manured, a crop may be insured the ;i year. As they are planted early in April, the following year gen- nn hem productive. They soon become infested by grass and clover, s growers deem it more profitable to renew the beds than to prepare the by laborious weeding for a second crop.

The varieties cultivated are Wilson's Albany, Lady Finger, Hovey, French's Downer's Prolific, and Cutter's Seedling. Of the older varieties, Bart-

lett, Austin, and Triomphe de Gand, and many others, have been generally discarded, not having proved reliable. On light or sandy soil it is labor lost to plant the latter-named kind, as it, in common with many others, among them the Lady Finger, Scarlet Magnate, &c., demands a good, strong loam. The Early Scarlet, May Queen, Iowa, and Downer's Prolific, and some others, will succeed on a light, sandy soil; but land of this character should not be chosen for the production of the finer strong-growing varieties. Russell's Prolific on small plots of strong, gravelly loam, has produced a very fine crop of the finest fruit, and it is, in the esteem of the fruit committee of the W. J. F. G. Association, one of the largest and most productive strawberries; but larger experience is needed to establish its claims to preference.

The cultivation of the raspberry is deemed of considerable importance in the townships of Burlington, Chester, and Cinnaminson. Forty acres were devoted to this fruit in 1864, which yielded from 20 to 60 bushels per acre, which, at 30 cents per quart, a probable average price received, produced a gross sum of $15,360. The varieties grown are the Philadelphia, Doolittle Black, the old Purple Cane, and the two kinds of Allens. Nearly all others have been rejected as tender or unproductive. At present the Philadelphia stands unrivalled as a market berry, being hardy, of large size, and exceedingly productive. It has yielded over 200 bushels per acre, and the fruit during last summer found ready sale at from 40 to 60 cents per quart at wholesale. It never fails to produce an enormous crop, and has been thoroughly tested as regards endurance of heat and cold. The variety is not new, though but recently disseminated, having been found wild in a wood near Philadelphia twenty-five years ago, but so highly prized that no plants were spared to the public for fifteen years. The demand now exceeds the supply. Four thousand plants were sold by one nurseryman in Burlington county, for $500. In 1863 there were nearly one hundred acres in the aforenamed townships devoted to the cultivation of the blackberry—Burlington reporting 75, Chester 11, and Cinnaminson 13, which yielded 5,264 bushels of fruit. This was an average product of 53 bushels per acre—Burlington producing 50, Chester 68, and Cinnaminson 66 per acre. The price per quart averaged 10⅜ cents, or $3 30 per bushel, and for the entire product $17,915 were received. The New Rochelle or Lawton and the Dorchester were the only varieties found adapted to field culture. In 1864 reports were received from five townships, in which one hundred and eighty-nine and a half acres were devoted to the growth of the blackberry; and of these Burlington occupied 100, Beverly 50, Chester 18½, Cinnaminson 13, and Centre (in Camden county) 8 acres. The entire product was 9,189 bushels of fruit, which sold in market at about $4 80 per bushel, and realized $44,107. This crop was much reduced by drought in one township, but the net returns were larger on the whole than in 1863. The prices obtained for small fruit in 1864, it has been shown, were much in advance of those for 1863. Unusually large profits were the consequence, if estimated in the inflated currency of the day. An exhibit of a few crops raised by individuals, and gross returns received, may prove of interest to many readers, who prefer bald facts to theories or generalizations.

One of the most successful growers of small fruits produced, on 3½ acres, 4,575 quarts of strawberries, for which he received $975; on 2¼ acres, 6,675 quarts of blackberries, which sold for $900 52; on 2½ acres, 2,226 quarts of raspberries, which returned the gross sum of $747 50; a total by one grower, on but 8¼ acres, of 13,476 quarts, which produced a gross return of $2,623 02, or at the rate of $307 per acre.

Another very skilful grower of small fruits produced, on 2½ ... quarts of strawberries, which are equal to 144 bushels, and sold the... $867 84. His blackberries, on one acre, produced him 1,600 qu... bushels, and sold for $240; an aggregate of $1,107 84 from ... acre

A third grower, evidently an expert, raised on 2¾ acres, strawberries which ld for $1,200, or at the rate of $436 per acre. One of the above gentlemen ld strawberry plants, which increased the income from his small plat to the m of $504 per acre.

The following crops of Lawton blackberries were reported, raised in Camden unty, in 1864:

1,143 quarts on 1⅛ acre, at the rate of 1,016 per acre..........	$172 50
,304 quarts on 8 acres, at the rate of 1,538 per acre..........	1,436 00
365 quarts on ⅛ acre, at the rate of 2,920 per acre..........	49 00
1,000 quarts on ⅕ acre, at the rate of 5,000 per acre..........	110 00

The largest plantation of eight acres thus produced 384 bushels, at the rate 48 bushels per acre, and sold at $3 74 per bushel, or nearly $180 per acre. e crops of blackberries have been raised on the same ground from which, nonth previous, an excellent crop of strawberries had been gathered. The kberry tied closely to wires, headed back during summer, and pruned in the rng, does not materially interfere with the strawberry plants around it, and uccession of fruits may thus be obtained from the same ground.

In Burlington county, on ten acres of thin land, from which the sand formerly ifted like clouds before the wind, six hundred and fifty bushels of Lawton kberries were gathered in 1862. The same plantation yielded seven hun- d in 1863, and in 1864 eight hundred bushels. A résumé of the report to the West Jersey Fruit Growers' Association, which does not include entire area devoted to small fruits in the counties of Burlington and Camden, the following gratifying exhibit:

	Acres.	Yielding in bushels.	Which sold for—
strawberries................................	488	27,924	$164,633 60
raspberries.................................	40	1,600	15,360 00
blackberries................................	189½	9,189	44,107 20

ording an aggregate yield, on 717½ acres, of 38,713 bushels, bringing 4,100 80.

CRANBERRIES.

The cranberries grown in New Jersey are, it is well known, of superior quality. der proper cultivation they prove very productive and attain a size and y unsurpassed elsewhere. As an example of their productiveness, we y state that a part of the plantation of W. T. Bates, of Cape May county, produced at the rate of 1,300 bushels to the acre, or one bushel to a space aree spuare feet. This must not, however, be regarded as the ordinary Favorable seasons have exhibited a product of upwards of 400 bushels rior cranberries, which command the highest market rates. The product berries, as reported to us in 1864, was much less per acre than the above. grower in Burlington county raised, on 25 acres, 1,000 bushels, for which received $8 per bushel, doubtless a net profit of at least $6,000.

not the shopkeeper or the mechanic, who has read "our farm of two ," or "four acres," or even of "ten acres," and deemed it "enough" for him could grow such crops thereon—who has pored over the fascinating pages such writers who have the faculty of making the reader utterly oblivious of l by which the crops were raised—imagine for a moment that compensa- rk does not form much the greater part of this seemingly large per acre. Let him not for a moment suppose these products growth of the Jersey soil, and that he will there find the houses are tiled with pancakes, and chickens

ready roasted cry, 'come eat me.'" Labor—continuous labor, early hours, broken rest, wearing watchfulness, are the price; and this oftentimes but indifferently paid. High remunerations are found only on soils and in locations specially adapted to produce early and abundantly. The results enumerated in this paper cannot be attained everywhere, even with high manuring and all the expenditures of toil and care and skill.

THE GREEN-SAND MARL OF NEW JERSEY.

The district to which the foregoing observations have mainly applied belongs to the cretaceous division of the geologist, and corresponds to the chalk of Europe. It comprises beds of clays, of sand, of gravel, and of green-sand or "marl." The section of the county of Camden to which the attention of the agriculturist has been chiefly directed lies in the western half, and is of quality much superior to the southeastern portion. The latter is included in the tertiary, and is mainly covered with sand and sandy loam, sometimes capable of producing crops under good culture, more frequently unfitted to endure any other burden but scrub oaks and dwarf pines. Wherever the sandy soil is underlaid by several feet in thickness of clay, cultivation might be conducted with promises of compensation; but where sand follows sand to the depth of many feet, perpetual drought must wear out the efforts of any useful plant to maintain an existence, and scrub oaks and stunted growths generally are but evidence of this lack of continued supplies of moisture during the growing season. Any person desirous of learning the capability of any part of this region may satisfy his inquiries by examining the growth of the crop already on the ground, (the bushes and trees,) or by boring with a common auger having a long shank, and thus determining the depth of the sand and the underlying clay. A sandy loam upon an impervious clay subsoil is often the most valuable for the growth of market-garden vegetables; but where we do not find an underlying clay of five or more feet in thickness, no useful result can follow the efforts of the cultivator. There are wide tracts of such sandy loams, or even of stronger texture, which are capable of improvement, because thus underlaid by a more retentive subsoil, and within reach of the marl deposits. Without resources from outside, they cannot probably be rendered productive. It is an error to suppose that these deposits of sand are worth but little. On the whitest of sands, resembling a sea beach, we have seen excellent crops of Catawba and Isabella grapes grown, even surpassing many we have observed on what would seem to have been much more congenial soil, and in districts esteemed for their fertility. In some parts of the southwest coast of France, vineyards are planted on the sand dunes or low hills of the coast, and the grapes produced thereon are among the best grown in France. Vineyards are planted on this sea sand, and fresh sands from the salt shore regularly applied, alternated every other season with ordinary manure. The vines being cut down, and the soil raised rapidly, covers the old stocks, which, as fast as buried, throw out new roots, and thus the vineyard is constantly renewed. This practice has been followed for two centuries with success, we may well presume. Nothing is needed in such sands but a due supply of organic matter and alkaline earth. At Truro, on Cape Cod, where the traveller would imagine himself almost beyond the region of agriculture—where he sees little else but drifting white sand, and scarcely any vegetation except a few stunted pines and poverty grass—Professor Edward Hitchcock was shown a piece of ground on which there were annually grown fifty bushels of Indian corn to the acre. The soil did not differ from the white sand around it, except in containing abundance of fragments of clam shells and enough organic matter to give it a dark color. Having extra these shells, that is, all the carbonate and phosphate of lime, and bu the organic matter, his analysis proved that nothing remained but t white sand of the cape. If thus the seemingly most irreclaimable and omising wastes may by art be rendered productive, how much better

st await the hand of skill and enterprise when applied to our far more hope- stretches of unoccupied lands. Over much of this hitherto neglected region beneficial effects of our "green-sand marl" are yet to be widely exhibited. remarks on the composition, value, and accessibility of this extraordinary of fertilizing material, almost unique in character and extent, may here aee d appropriate.

The rapid improvement in agriculture in a large part of lower New Jersey is be ascribed, in a great measure, to the intelligent employment of this so- d marl, which is found in the central and southwestern region in immense s. The belt or strip of land under which it is found extends obliquely the State, from Sandy Hook southwest to Salem; its length is about y miles, and its breadth fourteen at its eastern, and six miles at its western mity; and its area nine hundred square miles, or five hundred and seventy- housand acres. This deposit of fertilizing material has been worth millions dollars to the State, through the increased productiveness of the district to ich it has been applied, as well as the influence it has exerted in awakening l fostering a livelier interest in agricultural improvement.

The region of country in which it is found has been redeemed from desolation its use. Before its application much of the neighboring land had become y worthless through exhaustive cropping. Some of these lands, even in county, which, in 1830, were not worth five dollars an acre, are now a at upwards of one hundred dollars; and others could be named which re gained more than pristine fertility, and would readily sell at two hundred s. On most of these latter farms marl is abundant and largely applied. , removed from five to fifteen miles from the marl beds, have been equally ed by its liberal application.

Green-sand marl continues to be used in increasing quantities in all parts the State of New Jersey to which it can be cheaply transported, and is idly aiding in bringing the most unpromising soils to a high degree of fer- ty. Lines of railroad have been constructed expressly for conveying it to dis- points more cheaply and expeditiously. The business of transporting to distant points is yet in its infancy. There were carried on the sburg railroad, in 1864, upwards of 14,000 tons of Squankum marl, which distributed over a country from seven to twenty miles distant from the pits. Burlington railroad carried from Pemberton, in eight months, 15,000 tons, h were distributed along the line of that road, the Camden and Amboy, the ware and Raritan canal, and into Pennsylvania. The demand upon these will fall but little short of, if any less than, 50,000 tons per annum. The maen and Atlantic railroad conveyed, in one year, upwards of 10,000 tons, l the West Jersey railroad has commenced the transportation of marl to country along that line of road, and of the Millville and Cape May roads, ere the demand is such as to warrant preparations for an annual sale of),000 tons. The enlightened policy of conveying fertilizers at the lowest ble rates sufficient to cover cost, is alone needed along this road to render iness very large, and to amply repay, by the improvement of the dis- increased productiveness and consequent enlarged traffic, for the far- nberality.

The above exhibit of the burden of marl transported upon rail and by water but a small proportion of the amount distributed from the pits in a year. e great consumption still is in the vicinity of the "diggings," whence it can hauled by teams. By this means 10,000 tons have been taken from a single in one year, and distributed over the region, from one to six miles distant. pits are opened along the line of outcrop, and almost every farm ly situated has a "marl hole," as it is locally termed, thereon.

It y be said that the region under notice is peculiarly situated as respects a supply of cheap fertilizers, enjoying, in these respects, unusual. This is in a measure true, but a wide region of New Jersey, and

the adjacent States of Pennsylvania and Delaware, is of almost equally re access to the great agent which has regenerated West New Jersey. The beds of green-sand marl are but partially developed and but imperfectly work and are capable of supplying a much wider district with the elements of fe ity. The foregoing record of the results of the application of this remark deposit will, we trust, aid in disseminating a knowledge of its value, and exte ing its application into States which border on New Jersey, to which it may readily conveyed by rail or by water. The business of shipping this mate is but in its infancy, and the demand must increase with a knowledge of economic value. Having power equally valuable on soils remote from its regi it will probably yet overflow the country in every direction as rapidly as facilities for transportation shall be increased and the expense diminished.

The following analysis of marl from the second and third beds will be fo especially interesting to the farmers of Camden county, where the first-nam are largely applied. The first table will fairly represent that at White Hor the second, that obtained from the pits of David Marshall, near Blackwo town, the analysis of which was made by George J. Scattergood, of Philad phia; the third represents the Clementon marl, from the pits of George Ada

For the first and third of the above analyses we are indebted to the very v able reports of William Kitchell and Professor George H. Cook, superinte ents of the State geological survey. This survey was most unwisely suspen in its incipiency, and much of its valuable fruits lost, because of incompletene Seven years later, in 1864, it was resumed under the supervision of Profes Cook, who brings a hearty application of the value of the results to be obtai by a thorough scientific inquiry into the undeveloped resources of the St His second annual report for 1864, just published, is an outline of labors for past year, and a prelude to many others to follow, ere a final report shall m known to us the yet unexplored stores of mineral wealth hidden in our ro and soils, and which scientific research, under liberal State patronage, can al render available.

	White Horse.	Blackwood T.	Clemen
Phosphoric acid	2.657	4.821	2.
Potash	5.637	5.010	5.
Soda	....	1.080	
Lime	1.557	1.975	1.
Magnesia	1.476	1.375	1.
Prot. oxide of iron or green vitriol	....	22.740	14.
Alumina, or pure clay	23.875	6.610	6.
Silica, or pure sand	54.430	48.500	56.
Sulphuric acid	.649	....	
Water	9.963	7.500	....
	100.244	99.611	9

From the report of Professor Cook we extract the following table of analy of sundry "marls," spurious and genuine. The first is that of a spuri variety digged by Messrs. Ten Eyck, in Middlesex county; a similar be found on the farm of J. Stokes Coles, on the Atlantic railroad, four miles fr Camden, and has been applied to a moderate extent with as moderate result

The second is an analysis of a characteristic specimen from the first m bed, or the lowest well-marked stratum, from the pits of J. B. Crawford, M mouth county. This first bed is not as valuable in the district southwest of middle portion of Burlington as in Monmouth, where it is much esteemed. T third is an analysis of that from the second marl bed. This is an averag the green-sand which traverses the marl region from the Atlantic to the De ware bay. It is from the marl pit of R. Dickson, Woodstown, Salem coun

ourth represents the composition of the third bed, or upper stratum, utheast of those before named. It is from the pits of Hugh Hurley, iver, Monmouth county, and is an average of the stratum seen from Deal nton, in Camden county.
e analyses will exhibit to the reader the remarkable fertilizing value of reen-sand marl," in which potash and phosphoric acid form so large a ion.

	(1.)	(2.)	(3.)	(4.)
ric acid	1.15	1.12	2.65	3.73
	1.54	5.80	6.81	4.98
	2.52	11.67	1.04	4.15
a	2.15	1.97	1.81	.47
iron	31.50	16.93	19.80	18.70
	6.00	7.18	8.04	8.18
	34.50	40.61	49.73	49.68
c acid	1.27	.70	.11	2.44
	18.80	8.10	8.34	7.37
acid and loss	......	5.92	......	....
	99.43	100.00	98.33	99.70

THE CLIMATE OF SOUTHERN NEW JERSEY.

easing tide of immigration is tending toward the uncultivated lands of n New Jersey, and those who purpose to remove thereto should be in- of the healthiness of the region, as well as its capacity for the produc- the necessities of life. Much has been written by parties more or less ed in the sale of lands; how reliable we will not pretend to deter- One of the peculiar advantages possessed by the lower counties of New is the mildness of the climate in winter. This is a feature of extreme o many northern men who may desire to change their habitation. To hose families have suffered from the rigors of northern winters near the d, and have drooped under frequent colds and rheumatism, or are d with pulmonary disease, the climate of southern New Jersey may r inestimable value. In one settlement more than one-half the families the South to save the life of one or more members, who have, in many es, been restored by the change.

study of the comparative climate of lower New Jersey, as of the Atlantic further south, and the western States in the same latitudes, will illustrate ts that the summer mean temperature of the peninsula of New Jersey is e or higher than the same mean throughout the breadth of Virginia, heast to southwest, along the foot of her main ranges of moun- as warm as the same district in middle North Carolina and north- h Carolina, middle Kentucky, southern Indiana, middle Illinois, n n Missouri. Its summer mean is therefore greater than that of any I lvania, Western Virginia, Ohio, northern Indiana and northern , or the States north of all these. Its winter mean temperature is the s t of middle Virginia at the foot of her mountains, as middle Ken- southern Indiana and Illinois, and southern Missouri. She has not a n her those climatic features which are termed fickle, by which she to great diurnal ranges of temperature, and great and sudden changes

fr one extreme to another are well known in the west, but ;, are experienced less frequently and less severely in

lower New Jersey. Her winters are therefore much less extreme than tl places in the same latitude in the western States, while her summers are abo as warm.

According to the census of 1850, the deaths from consumption were in th following proportions to the whole mortality, viz: In Maine 22½ per cent.; Ne Hampshire, 22; Vermont, 24; Massachusetts, 17⅝; Connecticut, 16⅝; Rhod Island, 21. In 1853, the percentage in Massachusetts reached 23½. In th middle States, New York, in 1855, exhibited a percentage of 17; New Jerse in 1850, 14⅙; Pennsylvania and Philadelphia, 12½; Maryland, 11½; and De aware about 10 per cent.

By the census of 1860, the percentage of deaths from consumption, thoug generally higher for all the States named, was again much greater in the easte New England States than in Delaware, Maryland and southern New Jerse Deaths from all diseases of the lungs bore nearly the same proportion, rangin in Maine from 35 per cent. to 33 in New Hampshire and Rhode Island; 3 in Vermont and Massachusetts; 28 in Connecticut; 25 in New York; 22 i Pennsylvania and Maryland; 24 in New Jersey, and 21 per cent. in Delawar

Thus in New England, generally, the deaths from consumption alone were, i 1850, twice as great as in Maryland, Delaware and Philadelphia; which di tricts correspond, in climatic peculiarities, more closely with the peninsula lower New Jersey than would the entire State for which the percentage given. For all diseases of the lungs, the percentages of deaths in New En land are from 10 to 14 per cent. higher than in Delaware, Maryland and N Jersey; and the chances of freedom from consumption are doubled, and probabilities of escape from fatal pulmonary complaints increased upwards of per cent., in the more southern locality.

Great variations of temperature and humidity in a climate generally cool an damp, afford conditions extremely favorable to the production of various f of diseases of the respiratory organs, as is well known. These diseases appe to increase as the temperature decreases with like conditions of humidity; least such appears to be the case along the seaboard of the eastern State Diseases of the respiratory organs, of which consumption is chief, appear have their maximum in New England, on the seaboard of Maine, New Ham shire and Massachusetts, and to diminish towards the south and west in a r rate of decrease. The mild winters of Philadelphia are well known t northern sufferers from weak or diseased lungs, who make an annual p age to this shrine of Hygeia to escape the rude, raw northeaster, and the and cold of the eastern seaboard, or the scarcely less unpropitious region western New York.

The following table will exhibit the mean temperature and the extreme he and cold of sundry places north and west, which may serve to exhibit the rel tive mildness and equability of the climate of lower New Jersey.

The records for Camden county and for Cumberland county have been car fully compiled and reduced, and though made at points forty miles sep have much in common, and may be accepted as the best exhibit of lower Ne Jersey climate accessible.

The resident of Maine, New Hampshire, Vermont, or middle New York by a glance at this table, perceive how much he would gain in ameliorated te perature by removing from a district where, in January, the low degrees of to 22 below zero are the common minimum, to one where the mercury seldo descends below zero, and where the low temperature of New England or consin and Illinois have not been known within the memory of the old itant. The extremes of heat are not higher than in Maine and in Illi , w the range or variation of the thermometer is much smaller than at y of localities named.

Month.	MAINE.			NEW HAMPSHIRE.			VERMONT.			MASSACHUSETTS.		
	York county.			Grafton and Coos counties.			Chittenden co.			Hampden county.		
	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.
	°	°	°	°	°	°	°	°	°	°	°	°
January	42	—9	21.7	36	—26	13	42	—20	21.4	52	—4	24.7
February	41	—11	24.6	38	—27	15.3	46	—13	23.9	52	—6	28.4
March	51	10	30.4	43	—4	23.2	53	8	30.0	53	15	34.5
April	60	26	37.9	56	24	35.4	61	30	40.0	65	31	42.1
May	82	36	54.9	74	32	51.3	78	34	56.1	86	39	59.6
June	92	45	66.7	82	35	58.5	85	41	63.2	91	46	65.3
July	93	55	72	87	47	64.5	85	53	68.3	90	53	71.4
August	97	56	70.7	90	51	65.3	87	50	66.8	95	56	70.1
September	72	39	56.5	72	32	51.3	69	38	54.0	77	40	57.8
October	66	31	45.4	69	26	45.5	64	25	42.5	72	28	46.9
November	62	18	36.2	60	12	32.3	65	19	38.9	65	15	38.4
December	44	—11	23.8	44	—19	19.5	54	—14	26.6	51	—2	28.0

Month.	NEW YORK.			ILLINOIS.			WISCONSIN.			NEW JERSEY.					
	Onondaga county.			Peoria county.			Milwaukee co.			Camden co.			Cumberland co.		
	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.	Highest degree.	Lowest degree.	Mean temperature.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
January	58	—5	25.3	66	-22	23.4	49	—30	18.8	65	7	32	?	?	32.13
February	49	—5	28.9	59	—5	33	48	—18	?	56	5	33.8	?	?	35.71
March	54	3	29.9	68	14	38.8	52	—1	30.7	61	22	39.3	60	22	39.4
April	60	27	41.1	74	38	49.5	61	30	?	77	36	49.6	77	36	50.7
May	82	35	57.8	92	39	66.4	68	46	55.2	85	48	65.8	87	46	66.6
June	90	42	66.8	95	52	73.9	97	39	65.2	96	53	69.2	98	54	69.8
July	93	51	71.3	98	59	78.0	94	52	71.3	91	58	74.4	92	55	75.1
August	91	51	68.6	97	55	75.2	92	49	69.8	91	58	75.4	92	59	76.6
September	76	40	57.0	98	43	67.3	84	40	61.0	79	50	63.4	79	51	64.6
October	66	31	44.4	72	34	50.1	60	28	45.7	75	35	51.3	73	38	53.2
November	64	20	36.5	74	11	40.1	60	3	32.1	71	19	43.6	65	21	43.8
December	51	3	26.4	67	—6	25.6	53	—15	20.1	62	14	35.0	60	16	35.7

The spring opens so early in this district as to be a matter of astonishment visitors from the remote northeast. In 1858, on the 26th of January, gardeni commenced in Cumberland county, and the last week of February the labors the field may begin with the planting of peas. This is often succeeded b series of cold days, which prevent further operations on the soil. From middle to the last of March early potatoes are generally planted, oats is so times sowed, and by the 5th of April asparagus is sometimes brought to the tal

Snow disappears early in March—seldom lies many days; thunder with lig ning and warm weather follow, and the spring opens; an occasional frost appear until about the end of April. Many readers, who are not familiar w the terms and the measures of mean temperature, range of thermometer, & may desire a more definite idea and comprehension of climate, from the enu ration of the above data of gardening and farming operations, which they compare with those known in their own districts. The dates of leafing of ea spring plants indicate the early stirring influences of the sun's rays in this tion, betokening the advent of spring in an unmistakable manner. The sl bush *(Amelancheir canadensis)* put forth its leaves in Burlington county, N Jersey, in 1852, on the 20th of April, five days before it opened in the up Shenandoah valley, and two weeks before the same appearance at Gettysb Pennsylvania.

The Virginian locality is two degrees further south, but more elevated; Pennsylvanian one-third of a degree lower than the New Jersey station. leafing noted was also three and a half weeks prior to that of the same plan Richmond, Massachusetts, and at Manchester, New Hampshire.

The blooming of the strawberry took place at Burlington city, New Jers in 1852, on April 26, and at Gettysburg and upper Darby, near Philadelp on May 6, or ten days later. At West Point, New York, it occurred on the 1 of May, three weeks later, and one week before blooming at Flatbush, L Island, one of the most favored northern localities. In 1852 the strawb ripened in Burlington, New Jersey, June 2; at West Point, New York, J 10; North Attleborough, Massachusetts, June 12; Londonderry, New Ha shire, June 15; Steuben, Maine, June 20; and at Manchester, New Hampsh June 25—a difference of three weeks in favor of the New Jersey locality. 1859 at Haddonfield, New Jersey, the strawberry ripened on May 23, and 1860 on May 29, the earliest dates noted for many years past.

In 1855 the lilac *(Syringa vulgaris)* bloomed at Moorestown, Burlington co ty, New Jersey, on the 1st of May; at Lima, Delaware county, Pennsylva in the same latitude, on the 12th; at Flatbush, Long Island, on the 17th Rochester, New York, on the 18th; Spencertown, New York, on the 20th; at Steuben, Maine, on the 13th of *June*. This excellent index of opening blo blossoms in west New Jersey ten days before it appears in Pennsylvania in same latitude; three weeks before the most favored parts of Long Island; n than three weeks before its appearance at Boston, Massachusetts, and five we earlier than at Steuben and on the coast of Maine generally.

At points further south in the peninsula of southern New Jersey, the acti of vegetation in the spring commences from two days to a week earlier tha indicated by the above dates. In Cape May county, at the southern extre of the State, early vegetables are ready for the market as soon as if grown in favored districts of Virginia.

The following table is the result of careful observations made during the 1864 at Haddonfield, New Jersey, and is the most reliable and complete d of extremes and mean temperatures and atmospheric humidity to which we l access. Very few extended series of observations have been made in this trict, but the following is worthy of credence, and may be consulted with ad tage by those who comprehend its teachings.

Summary of meteorological observations made at Cole's Landing, near Haddonfield, New Jersey, 1864.

Month.	Mean monthly temperature.	Rain and melted snow, in inches.	Snow, in inches.	Highest temperature.				Lowest temperature.				Humidity.							
				Highest degree.*		Warmest day.		Lowest degree.*		Coldest day.		Grains of vapor in one cubic foot of air.				Percentage of saturation, 100 = saturat.			
				Date.	Temp.	Date.	Temp.	Date.	Temp.	Date.	Temp.	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	Mean.
	°				°		°		°		°								
January	32	2.46	6	28	65	28	48½	7	7	2	12.33	†1.57	1.70	1.64	1.63	†81	69	77	76.00
February	33.83	.02	....	28	58½	28	48.16	18	4	17	7.16	1.97	1.67	1.67	1.77	68.8	54.5	68.6	63.96
March	39.34	6.03	7.5	13	61	5	50.83	21 & 22	16	22	26.33	1.85	1.97	2.07	1.96	80.9	54.8	73.2	69.63
April	49.56	2.99	....	24	78	24	68	4	28	5	38.50	2.66	2.77	2.77	2.73	73.9	55.53	73.2	67.54
May	65.83	7.09	....	10	87	31	75	2	35	3	49.66	4.76	5.29	5.00	5.02	78.1	57.0	75.6	70.23
June	69.23	2.39	....	26	96	26	84.67	11	43	11	57.16	5.20	5.40	5.20	5.27	73.5	51.3	69.6	64.80
July	74.40	3.12	....	12 & 13	92	31	82.83	23	46	22	63.83	5.77	6.14	6.12	6.01	75.6	48.9	72.0	65.50
August	75.39	2.52	....	1	93¼	1 & 11	83.33	31	52	31	63.50	7.90	7.64	7.10	7.55	84.3	63.6	82.0	76.60
September	63.36	6.55	....	24	78½	23	69	26	42	25	50	5.12	5.30	5.03	5.15	83.34	66.05	83.6	77.67
October	51.27	1.85	....	6	75	6	69.17	10	35	9 & 22	46.66	3.40	3.60	3.50	3.50	87.23	58.49	86.27	77.33
November	43.63	3.53	....	9	71	9	67.17	24	19	24	26.33	2.66	3.10	3.00	2.92	87.87	64.56	83.59	78.67
December	35.00	5.24	12.5	3	57	3	53	23	8	12 & 23	19.87	1.91	2.05	2.00	2.99	87.40	70.8	78.10	78.80
Total	52.73	43.79	26	....	....	....	....	....	....	....	....	....	....	....	3.87	80.16	59.54	85.23	72.22

* From maxima and minima thermometers.

† Mean for six years in Philadelphia

An examination of the above table will show to those who are familiar with the indications of the thermometer, the relative temperature shown by monthly means, as well as by those which exhibit the highest and lowest degrees, that the average or mean temperature for the year 1864. in Camden county, New Jersey, was about 53¾° of Fahrenheit—that there fell, during that year, sufficient rain and melted snow to have covered the ground (if it had not evaporated, sunken into or ran off from the surface) to the depth of 43¾ inches, or about 3 feet 8 inches; that there fell 26 inches of snow, which was divided over three months; and that at no time, in any month, more than 12½ inches fell; and of this 12½ inches, but 6 inches fell on any one day.

The highest temperature was 96°, and the warmest day 84°.67. The coldest extreme was 4° above zero, and the coldest day 12°.33. The range of the thermometer was thus 92°. The average temperature of the months during which vegetation is most active was 70°.59. The mean of spring, 51°.88; of summer, 73°; of autumn, 52°.75; of winter, including the temperature of January and February, 1865, was 30°.67. If the winter of 1863–'64 be included, its mean would be found to be 33°.24. February of 1865 has been unusually severe, and lower temperature observed than for eight years previous; and on no day did the mercury descend below zero at the usual 7 a. m. observation; though, during the nights of two days a minimum of a few degrees lower was noted.

Some rain or snow fell on 119 days during 1864; of the clear days, less than $\frac{3}{10}$ cloudy, there were 101; of cloudy days, more than $\frac{3}{10}$ cloudy, there were 265. The latest injurious frost, or fall of temperature to 32° or lower, was on April 29; and the earliest frost in autumn, sufficient to destroy vegetation, occurred on the 10th of October.

The period during which no frost occurred was 163 days, (or nearly five months,) which enjoyed a mean temperature of 67°.88. The average relative humidity of the season free from frost was 67.48 per cent. of saturation, or of the amount of humidity which the atmosphere was capable of sustaining, indicating a comparatively dry air. The amount of humidity or moisture in the air is a very important meteorological element. This with the amount and distribution of heat are those most essential to the agriculturist, since they principally determine the capacity of different districts for the production of vegetable food. There is no reason why the indications of humidity, as measured by instruments, should not be as readily understood by the instructed agriculturist as are those of the thermometer, except the impossibility of obtaining access to reliable data for determining the amount of this most important element in our local atmosphere. We have, therefore, given the results of close observation during the past year, by which the varying proportions of vapor in the air may be readily learned. In June and July it will be observed that the relative humidity fell to a very low degree; that for July, at 2 p. m., being but 48.9 per cent., or less than one-half the amount that could have been sustained in the air, and is present immediately before and during a rain.

The summary and means for each month does not fully illustrate the extremes of dryness and humidity by which, as well as the mean amount, the district under consideration is greatly influenced. This branch of our subject is worthy of more extended discussion than our space will here admit.

The district of country of which Vineland forms a part enjoys a climate intermediate between that of Camden and Cumberland counties, whose peculiarities may be learned by inspection of the tables of comparative temperature. The lines of equal summer temperature, instead of ranging in a general eastwardly and westwardly direction, as they commonly do, are here deflected until they extend nearly from north to south. The same summer temperature known at Progress, on the Delaware, above Philadelphia; at Haddonfield, Camden county; and at Greenwich, Cumberland county, is the measure of the summer heat for Vineland and its vicinity.

The equalizing influence of the ocean winds has caused the lines of equal ımmer temperature to approximate to the head of the coast, almost from Cape y to Sandy Hook. As these lines approach the higher hilly or mountainous ;ions of upper New Jersey, they are rapidly deflected towards the west and ɔuthwest, extending parallel to the Delaware river in its southwest course from 'renton to the head of the bay of the same name. The isotherms of summer eat of 70°, 71°, 72°, and 73°, thus form long close loops, whose summits are ı the upper and middle counties of New Jersey, while their lower extensions re in the southern counties of Pennsylvania and New Jersey respectively. This ꜱ a curious and very interesting feature of these districts. The interior and e western parts of the lower peninsula are, therefore, warmer, in the same ude, than on the Atlantic side. This is owing to the influence of the cold :uı ꜱ of water which come down from the arctic regions, between the coast ıne Gulf Stream, and deflect towards the south the lines of equal heat which to rise higher as they approach the coast from the inland regions. There s no point on the coast at which the temperature of the summer is greater, be- :ause of the existence of the Gulf Stream, the influences of the land or of the ırctic current predominating. The average summer temperature for Vineland s believed to be about 73°, which is the same as that of Philadelphia and Had- lonfield, thirty miles north. Its spring mean temperature is about 51°, or that ıf Philadelphia; its autumn, nearly 55°, or one to two degrees warmer, and its vinter about one degree warmer, than at Philadelphia. The temperature for he year is almost identical with that of the latter place. The above data have een derived from tables of observations made at Greenwich, and correspond :losely to the deductions of Lorin Blodget, the able and experienced climatolo- ;ist, . leading authority on this subject. If the prevailing winds were not ıne land towards the sea, the climate of the Atlantic coast would be much ıon l by the proximity of waters of so high a temperature as those of the :tream, or of those at a moderate distance from the coast. Off the coast ıı ı folk, the winter observations, for a breadth of one degree of longitude, a ı temperature of the ocean water of 46°. The next degree of longi- was oı° and 65°, 69°, 68°, and 67°, successively. These temperatures :ly dify the heat at their respective localities, but their heats are borne ⊏urope, and but slightly affect the winter temperature of our coast.

POTATO CULTURE IN LAKE COUNTY, OHIO

SOIL REQUIRED—CHOICE OF SEED—CULTIVATION—CARE.

BY L. S. ABBOTT, PAINESVILLE, OHIO.

THE design of this article is not to present the subject in a scientific manner, ut to consider it, as the producer should, in the light of observation and personal ıperience.

The general reader, at least, is aware that the potato, at the time of the appear- : of the potato disease, was the almost sole dependence of the common people ı Ireland for food. What this vegetable was, and still is there, it is sure to be ı all countries in the temperate zone, when population becomes crowded. We also seen that in the northern States of this country the potato is the of the three staple articles of food. As such, it has come to be regarded y indispensable. This fact is sufficient to render a thorough knowledge ı ɒest varieties for use, the soil adapted to their growth in the highest per- their cultivation and after care, matters of the highest importance to the of the United States.

The statements which follow in the elucidation of these topics are based upon actual personal observation and experience in the potato-growing locality of almost national reputation—Lake county, Ohio. The county is the smallest in the State, only embracing eight townships, and of these only five, which reach the lake, contain potato lands. These lands are the ridges running parallel with Lake Erie, which, according to geological indications, have each, at different periods, defined its boundaries.

With some degree of care the calculation has been made, that in these five townships only one-eighth of the cultivated ground is potato ground; and while it is true that never, in any one season, is all this potato ground planted with the potato, yet it is the concurrent judgment of men of close observation that one-half million bushels of potatoes are annually grown and transported from this locality to the south, southeast, and east, to market.

The average price one year, with another, never, even in common times, falls below a half dollar per bushel, and hence it will be seen that this is the best, the money-making crop of the locality.

SOIL.

The potato, to be of the highest quality, must have a soil exactly adapted to its growth. It may be said to be, in this regard, like the onion, "notional." In no argillaceous soil can the potato be grown to perfection, as regards quality. It requires, to attain this, a dry, warm, sandy soil of moderate fertility. Quality depends upon a soil which will produce tubers mainly of a medium size. In such case the yield must not be over one hundred to one hundred and fifty bushels per acre. To obtain a greater yield the ground must be richer, so that while the number may be increased, the tubers will also be larger; and just in proportion as the above number of bushels per acre is increased, the quality is deteriorated, and the liability of the crop to rot is augmented. As to size, for quality, the Peach Blow, for instance, should not have an average diameter of more than two and one-half inches. Indeed, I would never have one larger, if it could be avoided. This potato when grown in a strong productive soil will assert its natural tendencies to be large, coarse-fleshed and ill-flavored; but when restrained by right culture it is among the best of the potato family.

The rule for soil and culture applied to the Peach Blow, applies to all the other varieties of general cultivation. The producer should aim to obtain a medium growth only of all varieties, and then, with sandy soil, he will have the highest quality of potatoes. The potato lands of Lake county are yellow sand.

MANURING.

It not unfrequently happens that the soil is too poor even for potatoes. In such case manuring in the hill should be avoided if possible, as it is rarely ever attended with satisfactory results. If the season is not very favorable, the manure will go through with the second heating process, burning up its substance, and leaving a dry, unrotted residue in the hill, and if there be any potatoes they will scarcely exceed the size of a quail's egg. If, however, the manure properly decays, the growing potatoes from its proximity to them may receive too great a stimulant, and therefore be predisposed to rot. As a general rule, it is better not to manure those in the hill. Manure the ground broadcast, and, if possible, one season before potato-planting, occupying the ground with some other crop.

PLANTING.

The preparation of the ground for the planting of the early varieties commences as soon as the frost is fully out of the ground. Sand becomes dry as soon as the water is allowed to percolate without obstruction through the soil. Two or three days from a very wet condition is sufficient to render such ground fit for the plough.

VARIETIES.

Every grower's observation has established the fact that, for quality, the late rieties excel the early ones. The English Stamp (locally it is more com- nly known as the Rust potato, taking the name of the man who introduced is claimed to be, by its friends, the earliest of all the early varieties, is of cellent quality, and is not very liable to rot. The Early June is very early, d it is grown only on account of its earliness. In quality it is very inferior. he Cherry Blow is early, grows large and yields well, but its quality is quite different. The White Neshannock, better known as the White Mexican, is a ry fine potato for quality, but yields very poorly. The Early Kidney and the horn are perhaps as early as any grown in this locality, but in quantity y make a poor return to the husbandman for his labor. In quality they are ry good. The old time-honored Neshannock (or Mercer) is among the latest the early varieties. No testimony is needed in regard to its quality. For few months after maturity it is very excellent, but as the time for plant- g approaches, its quality is deteriorated somewhat. It is grown yet to some tent as a late potato, but its liability to rot discourages its cultivation.

The late varieties now cultivated are reduced to a less number than the early. he Carter is one of excellent quality, but its liability to rot has been a good on for discontinuing its cultivation almost entirely. Probably the old style Pinkeye, in the matter of quality, is not excelled by any potato ever wn; but under circumstances favorable for its healthy growth its size is ry small and its product unremunerative. It is rarely cultivated now. The rous other varieties cultivated in past years are now discarded, and we really but one late marketable potato, and that is the Peach Blow, originated New Jersey. It was introduced in Lake county in 1859—Mr. R. Marshall g the principal grower that year.

tato has so many striking peculiarities and so many excellent traits an extended notice of it is warrantable. If planted in a rich argillaceous u it grows large, is hollow in the centre, is coarse in flesh, is very inferior in ty, and, under these circumstances, has a tendency to rot somewhat. Under orable circumstances there is no potato known to this locality that is so secure this against this disease. A more satisfactory crop of the Peach Blow can be own on poor soil than of any other variety known. It will grow successfully the ground, year after year, which no other variety will do. Planted er so ty, it remains green through the hot, dry weather of the summer, and ver for tubers and matures them until the fall rains come, and then there is no which does this so quickly. There is no other potato which may be before maturity, when the skin may be slipped off by pressure with the , that will have so much of that dryness and mealiness when prepared for , characteristic of the mature vegetable. Neither is there one which retains character and excellence from maturity to maturity again to the same degree is, in fine, with all of its qualities, considered the most perfect potato.

CUT AND UNCUT SEED.

I c om, generally, with growers to cut their seed potatoes. Economy, ly, first suggested the idea, and made the practice general. An e or ground will require of medium-sized potatoes planted whole, full twelve ls. As the seed is cut by many, from five to six bushels will plant an When the growers plant, as is customary, from five to thirty acres, and potatoes are worth from seventy-five cents to one dollar per bushel, the of from four to six bushels per acre appeals strongly to their parsimony, nen gular enough, the community generally have come to the conclu- t the seed is most judicious and most profitable. This conclusion not on accurate tests, and, therefore, no class of men were ever more

mistaken in regard to the correctness of a practice pertaining exclusively t own avocation than are these potato-growers. Ordinarily but two eyes a in a piece, and two pieces make a hill. Sometimes the pieces are cut so as to leave the most of the potato for eating. Cut seed never will prod good nor as many bushels of potatoes to any given quantity of ground as seed. To prove this, let any grower commence his field, for example, with of whole seed, and then plant every alternate row with cut seed, so that t and the cultivation shall be the same; make such a record, either by stal to each row properly inscribed or otherwise, as will prevent any mistak which rows were planted with the cut, and which with the uncut seed; anc the growing season is over, dig each, and measure by itself, and he will the uncut seed will produce the largest number of bushels on the same g

But suppose another experiment be tried. Let any grower select larg toes for seed and plant them whole. From this product do as before, continue to do year after year, and he will find that the potatoes will i size, and that, just in proportion as they grow or increase in size above medium, he will find his potatoes deteriorated in quality.

The experiments which established the above facts in relation to cut and seed established another fact—that small but matured uncut potatoes always be used. These planted in observance of conditions above state the grower, with a fair season and fair cultivation, will always produce p which, in all respects, will be of the highest attainable perfection.

HOW TO PLANT.

Unquestionably a greater yield of good potatoes may be obtained fr acre of ground by drilling the seed than by planting it in hills, as is done; but the labor with the hoe is greatly augmented thereby. The g after being well ploughed, should be deeply furrowed both ways if plan hills. If the seed is put down deep, the hills are easier made, and th weather does not so readily affect the plant. The practice of crowdi rows to within three feet of each other is a bad one. The potato should dug up, almost literally speaking, in hoeing it. A large, flat-top hill is sary to catch the rain, and afford plenty of room in loose dirt for the p to grow in. The covering of the dropped seed may be done very rapid very well with the small plough.

CULTIVATION.

The first act of cultivation should be with a light drag, just as the p are ready to come out of the ground. This disturbs the weeds whi already growing, and kills them. The after cultivation should be wi cultivator and hoe, keeping the ground level until the tops are grown high as they will grow and stand up, when the plough should be put in sist to form the hills, and thus end the cultivation.

THE POTATO DISEASE.

The potato disease is still a mystery. There are a hundred theories or less, in regard to the cause of it; but not one of them can establish claim to reliability. But this does not matter. He who will plant sound, and small potatoes, in a sandy soil, with a fertility as above state will produce per acre a hundred bushels of Neshannocks, or not to exce hundred and fifty bushels of Peachblows, will never be troubled with disease.

DIGGING.

Digging and storing is full half of the labor of growing and securing of potatoes. The digging is a long, tedious, laborious task. The plou planting and cultivation is the easiest half of producing and caring for th

Potato-diggers have been invented; but none have found their way into this region, which will do the work well on'y under the most favorable cir-
ınces. A small plough to turn a furrow away from each side of the row, a good hoe, and a man with a strong, active, muscular system to work it, is reliable arrangement as a digger yet found.

CARE OF THE CROP.

The care of the potatoes should begin with the digging. They should be picked up as fast as they are dug, not allowing them to lie on the ground several hours in the sun, as is customary. Light is very detrimental to potatoes, and strong sunlight pouring down on them will soon make its effect seriously apparent. The finest potatoes ever grown may be spoiled in a few days by exposure to the light; they may be spoiled substantially in taking them to market by the exposure incident to the present inconsiderate method of transportation. Hence the marketman who makes a sign of his potatoes in baskets about his shop-door, prepares a worthless article for his customers. Light changes the complexion of potatoes, as the observation of almost everybody will bear witness, from its normal one to green, and renders them strong to the taste and unrelishable. As soon after digging as convenient the potatoes should be stored in a dark place, and, if it be in a cellar bin, during the entire time that they lie there for the family use, or awaiting the market, they should be covered with a thin coating of sand to make the absence of light as perfect as possible.

The denizens of our cities know nothing of the excellence of the potato. As has been shown above, the character of the seed, the soil, size, and care during storage, are absolutely essential to excellence of quality. It will be seen, therefore, that the real difference in the value of different lots of potatoes is as great as in any other article of food—as much as it is between different lots of wheat, or as it is between different specimens of any other kind of vegetables. This comparative difference in the value of potatoes is recognized now by only a few people—those grown in certain localities command a higher price than others, and soon there will be an acknowledged difference in the quality and price even in the potatoes of the same locality; and when the necessary conditions are observed in the growth of the potato in all the potato-growing localities, and the facilities of transportation are so improved that they may be taken to market without impairing their quality, our city folks will relish and estimate the potato as an article of food as never before.

BOTANICAL HISTORY OF SORGHUM.

BY F. PECH, DEPARTMENT OF AGRICULTURE.

UNDER the name of Sorgo, several congenerous plants from the East Indies have been described from remote antiquity. Their agricultural value, fully appreciated in husbandry for the benefit of their seeds and juices, attracted the attention of the farmer and naturalist.

Pliny the elder, who flourished in the first century, describes, in his 18th book, chap. 7, a Sorgo plant under the name of *milium quod ex India in Italiam invectum nigro colore,* (millet, of black color, imported from the East Indies to Italy.) That name, *milium*, or millet, signifies thousands, alluding to the numberless seeds produced by these plants.

Fuchius, of Belgium, describes, in his History of Plants, in 1542, a plant under the name of Shorghi, which is precisely the true popular name of the Sorgo in the East Indies.

Jerome Fragus, in describing the plants of Germany, in the year 1552, gives the description of the same plants under the name of *Panicum Dioscorides et Plinii*, (bread millet of Dioscorides and Pliny.) Then the plant of Pliny was that of Dioscorides, the Greek, and already cultivated in Germany. Conrad Gesner, in his *Hortus Germania*, (German garden,) in 1591, names the same plant Sorghum. Matthioli, an Italian, in his Commentaries on Dioscorides, in 1595, describes it under the name of *Milium Indicum*, (Indian millet.) Lobel, a Belgian, in 1576, describes that plant as the *Sorgo melica Italorum*, (Sorgo, or honey of the Italians;) and, followed by Dodon, a Belgian, who, seven years later, 1583, in his Pemptades, names it *melica, sive sorgum*, (honey, otherwise sorgo.) This Latin name, *melica*, means pertaining to honey, which is the *mele* of the Italians, from which is derived *melligo*, (honeyish.) The synonyms of the last two authors are of great importance, to show that there was in Italy, besides the Indian millet, (Durra corn, *sorghum vulgare*,) another species which has been confounded with it, and which corresponds exactly with the Chinese sugar-cane; and if any doubt still exists, the following line from Lucian, a Roman writer, will entirely establish the fact: "*Quique bibunt teneri dulces ab arundine succos*," (those who drink in sucking the tender sweet stalks of canes.) See also Dod. Pemp., 4, 1, 27, and Matthioli, book 2, chap. 9. Lonicer, a German, 1589, and Gerarde, English, 1597, describe several varieties of these plants. Bester, a German, 1613, also describes it as the *Milium Plinii*, which plainly shows that this plant from Italy has been cultivated in Germany, Belgium, and England from the time of Pliny to the seventeenth century.

In 1623, the botanical reformer, Gasper Bauhin, in his Pinax, a work of forty years' labor, includes all the above names as synonyms, under the descriptive phrase of *milium arundinaceum subrotundo semine sorgo nominatum*, (millet cane, with nearly round seeds, called sorgo.) With the observations that the seed varies in color, from rufous to black, and from white to yellow, these names represent one or more species. In reading the above authors we found that the uses of these plants were various; under the name of millet they were used for making bread and feeding poultry; in some other instances, but in the middle centuries principally, when the Romans, conquerors of the world, came to change their classical language into the present Italian, that same plant, the millet, preserving its Indian name, sorgo, was also called *melica*, from the sweet taste of its juice. As the true Indian millet, (*sorghum vulgare*,) which is our Durra corn, does not possess the same sweetness as the present Chinese cane, it proves that the ancient botanists have confounded together the Indian millet and the Chinese cane.

Through Asia, by Egyptian and Syrian commerce, and from Italy to the coast of north Africa, the Indian sugar-cane has spread on African soil, where it has created the imphee races, so very different in appearance from the Chinese plants; and these varieties will, by the new impetus of cultivation, still further increase their polymorphous tendencies in the same manner as our wheat, apples, cabbage, &c.

From Bauhin to the present day the botanists have been more definite in the determination of these plants. Linnæus ranges them, in his genus *Holcus*, under the specification of *H. sorghum* for the Indian millet, and *H. saccharatum* for the Chinese cane.

Persoon, after a careful study of these plants, has divided the Linnæan genus *Holcus* to form a new one, which he calls *Sorghum*.

ATION AND DESCRIPTION OF THE INDIAN SUGAR-CANE AND ITS VARIETIES.

go sugar-cane belongs to the gramineous family, and is included in

SORGHUM:

HOLCI species, Lin.;
ANDROPOGONIS, Kuntz.
SORGHUM, Pers.

logy.—Name from shorghi, the popular appellation for the plants of s in t East Indies.

c ch acters.—Spikelets, (flowers with their husks at the end of the) two or three together on the slender ramifications of the pani- nes,) the lateral ones abortive or reduced to a mere pedicel, the mid- minal ones fertile. Glumes, (husk, hull,) coriaceous, closely bearded , becoming indurated after the anthesis, (blooming,) with or without lea, (inner husk,) membranous; stamens, three; styles, two, with tigmas. Stout, tall grasses, with solid stocks with pith.

te.—SORGHUM SACCHARATUM.

l names.

Milium quod ex India, in Italiam invectum nigro colore	Pliny.
Sorgo, melica Italorum	Lobel.
Melica, sive sorgum	Dodon.
Melica forte a melica sagina, aliis saginanda calamagrostis Dioscoridis	Cœsalpin.
Milium arundinaceum subrotundo semine, sorgo nominatum	G. Bauhin
Sorghum	Rumphi.
Milium Indicum arundinaceo caule, granis flavescentibus	Herman.
Holcus saccharatus	Linnæus.
Milium Indicum sacchariferum altissimum seminibus ferrugineo	Breynius
Holcus dochna	Forskal.
Holcus caffrarum	St. Clair
Andropogon saccharatum	Kuntz.
Sorghum saccharatum	Persoon.

names.

Sorgo.
Chinese sugar-cane.
Indian cane.
Imphee.
Caffer's bread.
Pain des anges, (angel's bread.)

iption.—Root, fibrous; culm, (stock,) thick, stout, solid, with pith, from welve feet high; leaves, lanceolate, acuminate, downy at the base; f ning a large, more or less diffusely spreading panicle, with the more or less verticillate, often nodding when in fruit; glumes, (husk,) flower, hairy, downy, and persistent. From the East Indies.

l.

offers nu r varieties, which form two races, the Chinese The Chi race is represented only by a single plant, which the a ve cific characters. The Imphees are numerous, ıy distinguished by their compact panicle, and by tively to the glumes, (husk.)

Artificial synoptical table of the varieties of sorgo.

- RIPE SEED...
  - longer than the glumes........ LIBERIAN ...... E-koth-la. Koom-hana. Boom-vwa-na. E-en-gha. Boo-e-a-na. E-ed-no-moodoa.
  - equalling or shorter than the glumes. GLUMES........
    - equalling the length of the seed. GLUMES.
      - closed, hiding the seed........ RED IMPHEE......Shla-goo-va.
      - open, showing the seed. GLUMES.
        - greenish white or ash color........ WHITE IMPHEE...Nee-a-za-na.
        - Black, or purple black. BRANCHES OF THE PANICLE..........
          - thin. Panicle long, widely spreading. TRUE CHINESE SORGO.
          - compact. Panicle short, erect, more or less appressed to the axis. GLUMES MOSTLY .....
            - downy ....EARLY SORGO....San-go-ka-haa.
            - smooth ....OOM-SE-A-NA ... Shla-goon-da. Otaheitan.
    - longer than the seed........ BLACK IMPHEE.

How to use this synopsis table.—Compare a fully ripe branch of sorgo with the descriptions placed at each end of the braces, commencing with the words "Ripe seed," placed behind and at the middle of the first brace; then applying the phrases at the ends of the brace, the reader will retain and follow the one which agrees with the seeds of the bunches leading to another brace, and so on until the name of the variety of sorgo in examination is reached; then, with that name, refer to the description given in its proper place.

...SSIFICATION AND DESCRIPTION OF THE VARIETIES OF SORGO.

EUSORGHUM. TRUE CHINESE CANE.

Paniculis sparsis, patentissimis.
Panicle thin, widely spreading.

VARIETY A.—*Chinensis.*

CHINESE SORGO.

Panicle compound, rhombic-ovate in outline, thin, loose, about a foot long, with the branches long, widely spreading and nodding at maturity. The glumes open, roundish ovate, acute, the outer one concave-convex, the inner somewhat smaller and keeled; seeds large, roundish-ovate, dingy yellow, plano-convex, crowned with the remains of the persistent styles, presenting at the base, on the flattish side, a small cavity in which is seen a small black spot.

This plant appears to be the original Holcus saccharatum of Linnæus, from which were produced all the African varieties.

(1) IMPHEE. AFRICAN RACES.

Paniculis confertis, ramis erectis subappressis.
Panicles compact, the branches erect, but more or less appressed.
semine æquantibus vel longioribus.
equal or longer than the seeds.
...umis hiantibus.
...umes open.

...t of seed obtained by the acre equals fifty bushels.
... of Marseilles, France, has obtained a fine red and permanent color from the

VARIETY B.—*Præcocia.*

EARLY SORGO.

Panicle compound, compact, rather cylindrical, about nine inches long, with the branches ascending and loosely appressed to the axis. Glumes black, mostly downy, principally towards the apex, oblong, acute, concave-convex, the inner one slightly shorter and more round; from the base to the middle they are smooth and shining, open at the top, showing the seed, which is oblong-ovate, pointed at both ends, rufous or yellowish, as long as the glumes, plano-convex, crowned at the summit by the remains of the style, presenting at the base, on the flattened side, a small cavity, in which is seen a small black spot

VARIETY C.—*Pinna.*—POMPOON.

OOM-SE-A-NA.

Otaheitan.

Panicle compound, compact, cylindrical, about nine inches long, with the branches strictly erect and appressed to the axis. Glumes black, with a slight purplish tinge, mostly smooth, oblong, ovate, pointed at both ends, and very acute at the apex, concave-convex, open and showing the seed; the inner one slightly smaller, and the outer one keeled on the back. Seeds rufous or sandy color, as long as the glumes, plano-convex, crowned at the summit by the remains of the persistent style, and presenting at its base a small cavity, in which is seen a small black spot.

Here several sub-varieties, with the seeds longer than the ;lumes, take place after the last two type varieties; the shape ınd the color of their panicle is nearly identical, but white; he branches are erect at their base, their summits are more or ess recurved in fruit, and their glumes more or less smooth; hey appear to be hybridizations forms between the early sorgo,)om-se-a-na, white imphee, and the Liberian.

The San-go-ka-hea, by its downy glumes, appears to be a ıodification of the early sorgo and the Oom-se-a-na.

'he { Slagonda........ Koom-ha-na..... E-both-la....... Ee-a-moo-da.... Lim-moo-ma-na. E-en-gha....... Boo-e-a-na...... } Are modifications between the Liberian and oom-se-a-na.

The Boom-va-na is a modification of the last sub-varieties ñd the white sorgo, which has inherited from it the color of its anicles.

VARIETY D.—*Albescens*, (whitish.)

WHITE IMPHEE.

Nee-a-ga-na.

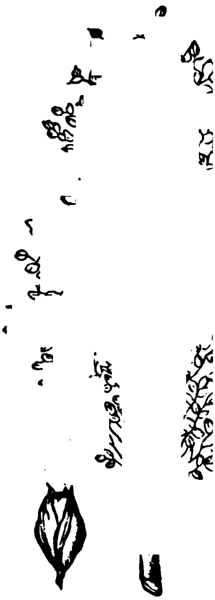
icle decompound, very compact, about ine inches long, the branches very osely appressed to the axis. Glumes vate, acute, concave-convex, smooth; ıe outer one purplish and keeled, the ıner one always whitish and shorter, oth widely open. Seed large, round, 'ate dingy white, plano-convex, 'owned with the remains of the persistent styles, and presenting at the ase a small cavity, in which is seen a nall black spot.

ıis clausis.
ıes closed.

VARIETY E.—*Nigerrima*, (deep black.)

BLACK IMPHEE.

Panicle compound, flattish, wedge-shaped, about six inches long, the branches thread-like, and more or less appressed to the axis. Glumes purple-black, smooth and shining from the base to the top, and downy along the edges, rather large, ovate, concave-convex, acute, longer than the seed, and closed; the inner one slightly smaller and keeled on the back. Seeds mostly hidden in the closed glumes, oblong, ovate, plano-convex, crowned by the base of the persistent styles, and presenting at the base of the flattened side a small cavity, in which is seen a small black spot.

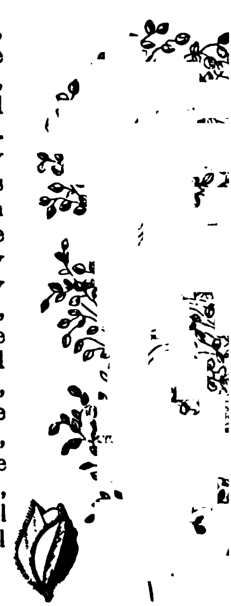


VARIETY F.—*Cerasina*, (cherry color.)

RED IMPHEE.

Shla-goo-va.

Panicle compound, rather slender, about fifteen inches long, the branches erect from the base, moderately spreading and drooping at the top in fruit. These branches are regularly whorled, leaving long intervals along the rachis between each whorl. Glumes as long as the seed, reddish yellow or cherry color, mostly downy; they are closed, round, ovate, acute, convex-concave, the outer one even, and the inner one keeled on the back. Seed round, ovate, dingy yellow toward the base, and clear purplish above, crowned at the top with the remains of the persistent style, presenting at the base a small cavity, in which is seen a small black spot.



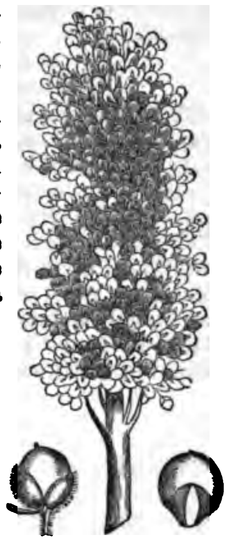
* * Glumis semine brevioribus.

Glumes shorter than the seed.

VARIETY G.—*Liberia*, (Liberia.)

LIBERIAN.

Panicle supra-decompound, angular cylindric, obtuse, very compact, about six inches long, the branches short and appressed to the rachis; glumes shorter than the seed, mostly smooth, shining, orbicular and open. Seeds longer than the glumes, round, obovate, tapering at the base, and much obtuse at the summit, reddish yellow toward the base, cherry color on the upper part, and slightly crowned by the vestiges of the styles, presenting at the base a small cavity, in which is seen a small black spot.



UCTION OF SUGAR FROM SORGHUM OR NORTHERN SUGAR-CANE.

LIAM CLOUGH, CINCINNATI, OHIO, (EDITOR OF SORGO JOURNAL.)

term sugar is applied, in a general sense, to the sweet principle of plants, and trees. There are several different kinds of sugar. Three kinds or are produced from sugar-cane, called, respectively, *cane* sugar, *fruit* and *grape* sugar. The last two rarely occur separately or apart from ortion of cane sugar, together with impurities and vegetable substances from the cane, and forming together an amorphous compound, variously uncrystallizable sugar, glucose, molasses, or sirup.

CANE SUGAR.

nce crystallizes readily from a pure solution, forming bold, trans- colori crystals, having the form of a modified, oblique, rhombic prism, in rock candy. It has a pure sweet taste, is quite devoid of odor, uble in water, and nearly insoluble in absolute alcohol. The formula of osition is, 12 equivalents carbon, 11 equivalents hydrogen, and 11 equiv- xygen. Its sweetening property is greatly superior to that of grape glucose. Cane sugar is believed to be exclusively the product of All attempts to produce it by artificial means have failed. It is, how- y transformed or degraded to fruit or grape sugar, and in all the ordi- of producing sugar from its natural sources, a large per centage is

converted to uncrystallizable sugar in the process. This reduces the commercial and intrinsic value of the product, and imposes a heavy discount upon the business. No part of the process of sugar-making demands more attention than the means of preventing the conversion of cane sugar, when present, to uncrystallizable sugar.

FRUIT SUGAR.

The elements which enter into the composition of this substance are the same as appear in cane sugar, differing only in the proportions of hydrogen and oxygen, or the elements of water, to the carbon, and only to the extent of one equivalent of each in this respect. Fruit sugar is composed of 12 equivalents carbon, 12 equivalents hydrogen, and 12 equivalents oxygen. It is uncrystallizable, and when pure has an intensely sweet taste. It occurs in fresh grapes, and many other fruits, particularly in such as contain considerable natural acid. It constitutes the sweet of new honey, and is probably the first product of cane sugar, starch, and lignine, when operated upon artificially, to effect their conversion. It differs from both cane sugar and grape sugar in rotating the plane of polarization to the left, and is for this termed, scientifically, *lævo-glucose.*

GRAPE SUGAR.

This body is composed of 12 equivalents carbon, 14 equivalents hydrogen, and 14 equivalents oxygen. The nodulous masses of sugar which appear in old dry raisins and the solid portion of candied honey afford the best natural illustrations of this substance. Cane sugar, starch, lignine, and some other substances, are susceptible of conversion into grape sugar. It is probable that grape sugar never occurs originally in nature, but is always the result of changes either natural or artificial imposed upon other bodies. Professor Anthon, of Prague, having devoted much time to the study of this substance, has succeeded in producing it, artificially, in almost a pure state, in which condition it affords regular, palpable, crystalline forms, unlike the warty and needle-like grains by which it was formerly distinguished. His researches afford new and important light upon this subject, revealing the fact that but little was formerly known with reference to the so-called grape sugar. This substance, like cane sugar, rotates the plane of polarization to the right, and is hence called *dextro-glucose.*

CONVERSION OF CANE SUGAR TO GLUCOSE.

Dense solutions of pure cane sugar in closed vessels, at ordinary temperatures, undergo no change. Dilute solutions in closed vessels are but slightly altered after long periods, but exposed to the air speedily change, being first converted to fruit sugar, afterwards to grape sugar, and subsequently fermenting. A solution of pure cane sugar, of the density of 25° Beaumé, boiled in an open vessel for two hours, becomes partly converted. At greater densities the conversion occurs sooner and more rapidly, about in proportion to the increased temperature of ebullition. Cane sugar is changed more rapidly by boiling if agitated so as to expose it to the air, or if a current of air be passed through the boiling liquid. Acids effect the complete conversion of cane sugar to glucose; strong mineral acids more rapidly than weak vegetable acids, and both much more rapidly with boiling them with cold solutions, the changes being in proportion to the strength of the acid and the temperature employed.

Alkalies promote conversion much less than acids. Some of them, as lime, the chlorides of alkaline earths, the normal sulphates and carbonates, when added to solutions of pure sugar, or when boiled with them, do not increase or accelerate conversion. Their presence, however, hinders or wholly prevents crystallization. Two parts of common salt, or of chloride of calcium, in one hun-

s of cane sugar dissolved, will prevent recrystallization. Solutions of ;ar with lime, when boiled, suffer conversion less than without lime, and ng kept they exhibit greater stability than when lime is absent; but with solutions, at temperatures favorable to fermentation, lime promotes con-

ase, an active principle existing in the buds of plants and germs of grain, apid conversion of cane sugar at ordinary temperatures. At boiling heat gulated and rendered inert. This is an insidious agent, and its presence apprehended in the juice of cane which exhibited, before being harvested, ncy to sprout at the joints.

-cane exposed to a temperature as low as 30° or 31° while standing in freezes, causing a rupture of the juice cells, and allowing the pure sugar-hich they contain to mix with the crude sap. This excites the first step rmenting process, and in a very few hours, if the canes remain exposed m sun, complete conversion of all the crystallizable sugar they contain ace. If stored in large unventilated shooks, or closely packed in sheds, p when wet so that any part of the mass heats to even a moderate de-version of sugar and subsequent fermentation occurs at the point affected, with the development of all the inexplicable agencies by which fermen-communicated. In a short time the whole mass partakes of the infection. step in the changes which thus occur is the conversion of crystallizable stallizable sugar, and this may take place before active fermentation is l, and without being even suspected

sugar contained in the expressed juice of sorghum, if the temperature is)°, begins to undergo conversion almost as soon as pressed from the more rapidly as the temperature is higher. In close humid weather, or rm rains prevail, particularly if accompanied with lightning, complete on occurs in a short time, followed or attended with the development of d, and exhibiting a condition of the juice entirely different from that sults from ordinary vinous fermentation. Small portions of juice left ipes or vessels, or minute fragments of saturated bagasse remaining in soon become changed, and when mixed with fresh juice excite the state ion which they have acquired, the vinous state exciting the vinous fer-n; the acetic, the lactic, the mucous or viscid, and the putrid, each in juice, first, conversion of cane sugar to glucose, followed by further to the particular state of the excitant, respectively.

operation of boiling cane juice, particularly the juice of sorghum canes, ntain a large proportion of earthy salts and azotized matter, conversion to glucose occurs extensively. If large quantities of juice are operated one time, involving a long exposure of the solution to boiling heat, the n becomes total, and this result is inevitable. Other effects of an inju-racter are produced by protracted exposure of the juice, or rather of and nearly concentrated solution to heat, which will be referred to

VARIETIES OF CANE WITH REFERENCE TO SUGAR.

nphee or African canes have been found more productive of sugar than se; although all varieties have afforded crystallizable sugar, and its n or occurrence, unexpectedly to the operator, is frequent, and is be-re common every year.

mphee canes, the variety known as *Oomsceana*, by some called *Ota-* most distinguished as a sugar-producing cane. The stalks of this re tall, the panicle close, seeds nearly enclosed in the hulls, which are ple, nearly black; color of the seeds orange, or a dingy brown. The ne stalk are short at the base, and increase in length towards the top,

as do nearly all the imphees. This cane does not resist winds well, but is fre quently blown down flat, forming a tangled mass, very difficult to harvest.

The peculiar imphee odor is very prominent in the Oomseeana. It re itself to the passer-by while growing in the field, and very decidedly in the va while boiling. The sirup partakes of the same, and on this account the variet is rejected by many cultivators, notwithstanding its superior sugar-producin qualities.

Nee-a-za-na or white imphee produces sugar frequently. The panicle of th variety is short and compact, the upper part generally drooping. Seeds larg and very abundant, projecting beyond the hulls, and presenting a lighter a pearance than any other variety. The seeds are in fact white, except the po tions which project beyond the hull, which acquire a light brown tinge. Th stalks are short and heavy, joints of graduated lengths. This cane stands e with much stability. It should be worked early, before the seeds begin harden. The imphee odor is less marked in this variety than in the Oomseean and it affords a light colored, pleasant sirup. The sugar from it appears in larg well-defined crystals, and it is drained or "purged" with more facility, perh than any other variety. The product of Oomseeana per acre is generally than that of other varieties.

A variety known as *Shla-goo-va* or red imphee, not largely cultivated, ha been little tested with reference to its sugar-producing qualities, though the oc currence of sugar in its sirups has been reported in a few instances. The panic of this variety is long and somewhat bushy, the foot stalks slender, inclined droop, in some cases very long, and presenting the appearance of broom-corn The seeds are closely encased in the hulls or glumes, and these of a dark re color when fully ripe, approaching a purple hue. Stalks tall and slender, joint in graduated lengths, liable to fall or be blown down by winds.

Black imphee is an early variety, not very productive and not gene popular, though a few operators report well of it. Panicle short, compact, closely encased, glumes glossy black, stalk short, color of sirup dark and generally rank.

Liberian, a variety of imphee but recently introduced to notice in the norther States, and not yet extensively cultivated. This is a very promising cane, the indications are that it will afford sugar. It is very distinctly marked by n seeds, which are small, very round, and of a rich cranberry color. The panic is large, compact, the seeds being closely compressed except at the top, wher a clump of more flexible foot stalks appear, which bend over and droop a littl The stalk is large, but shorter by one or two feet than the Oomseeana; distanc between the joints graduated, sometimes very short at the base, but increasin to a good length above; affords a great quantity of juice of average saccharin richness, and of a very pure sweet taste; color of sirup light, flavor mild, be traying but little of the peculiar imphee quality. This cane stools out antly from the seed, affording, in good ground, a heavy stand from two or grains in a hill. It stands up rigidly against all winds; in this respect greatly superior to any other variety. The Liberian appears to retain its tity, refusing to amalgamate with other canes even when grown in close pro imity to them. It is, however, suspected that other canes, particularly Oomseeana, become impregnated by the Liberian, displaying in the color shape of the seeds evidences of the admixture.

The sorgo or Chinese cane is more generally distributed and much more ex tensively grown in the northern States than the imphees. It is most highl esteemed for productiveness, and for the quality of its sirup, being usuall more mild and pleasant. It rarely affords crystallizable sugar, and until recentl was considered incapable of producing it. Considerable sugar was, howeve made from sorgo in the season of 1865. A barrel of sugar, made by W Edgerton, Henry county, Indiana, from Chinese cane, was exhibited to

Cir ati Horticultural Society in the spring of 1866, and found to be of very or quality, having large, bold grains, and quite free from the gummy e which is commonly present in these sugars. It is, however, entirely t that the sorgo or Chinese cane has been less productive of crystallized than the imphees, and, from what is at present known, it affords less r for the sugar-making enterprise. The results of another year may, however, change or invert the popular notion upon this subject and give sorgo priority. Inversions of prevailing opinions upon similar questions have n frequent in the experience of cane-growers, and it would be unwise to ndon the idea of producing sugar from the sorgo cane until much more carey tested.

The sorgo cane is tall and slender, distances between nodes nearly uniform; icle branching, showing a cone-shaped outline; seeds nearly enclosed in , but when fully ripe expanding the hulls and revealing the yellow or rownish tinge of the exposed part of the seed; juice rich, tolerably abundant; uality of sirup more mild and pleasant than that of the imphees generally. This cane is very liable to fall down of its own weight, and a strong wind upon heavy growth prostrates it, reducing the whole to a tangled and impenetrable et. This is a common and a very important objection to the Chinese ty.

Early sorgo, a variety or rather a class of canes designated by this name, as been cultivated to a small extent. The only respectable cane of this class which was developed from the regular sorgo by careful selection. A f two or three weeks in time of maturity was obtained, and this quality as remained permanent; but it was secured at some sacrifice of length and of stalk. It is distinguished from the regular sorgo by the increased size greater prominence of the seed, and by a downy growth near the margin of glumes, particularly toward the points, imparting a grayish cast to the le when seen from a little distance. Its capacities as a sugar-bearing cane, it have any, remain undiscovered. Several canes of this same class have ared under various names, coined or imported, for the purpose of giving t to schemes of speculation. They appear to be derived from an amalga- of the sorgo, perhaps the early sorgo above referred to, and the black The yield of sugar from these *fancy* canes is prodigious, if advertise- can be relied upon, but, unfortunately, the newspaper traditions have not ealized in practice.

SOIL AND CULTIVATION.

The subject of soil for cane, particularly when sugar is contemplated, is ortant. Roots of plants take up fluids from the soil; these contain solu- tters of various kinds, some of which are required for the growth of p t and are appropriated to that purpose, but by far the larger portion n up is not required, and is either excreted, or, at the time the cane is ested and severed from the roots, remains in the crude sap. When cane is ground, the crude sap with all the soluble earthy matters which contains is pressed out, and forms a portion of the juice. Rank soils, ni a large portion of soluble salts, particularly those of a saline nature, ly unfavorable; they oppose the production of sugar in three ways: rst, by preventing its development in the cane; secondly, by promoting the ion of crystallizable sugar during the process of boiling; and thirdly, by n the crystallization of that which remains. Badly-drained lands, it not rich, by retaining their moisture for long periods, losing it only by w process of evaporation, contain a large percentage of deleterious salts. un d manures, or those containing a large percentage of ammoniacal (as ole manure, hog manure, and some of the guanos,) are injurious, y when applied to undrained or highly retentive land. Professor

James F. Johnston, referring to the presence of earthy salts in the juice of sugar beet, and the effects of manures in the same connexion, writes: "Ce sirups remained behind, which, though they certainly contained cane sugar, refused stubbornly to crystallize; and the reason of this was traced to the presence of saline matter, chiefly common salt, in the sap. This salt forms a c with the sugar and prevents it from crystallizing. And so powerful is this influence that one per cent. of salt in the sap will render three per cent. of the sugar uncrystallizable. To overcome this difficulty, new chemical inquiries necessary. As results of these inquiries it was ascertained, first, that the tion of sugar was larger and of salt less in beets not weighing more t ve pounds. The first practical step, therefore, was, that the sugar manu rer announced to the cultivators, who raised the beets, that in future they would give a less price for roots weighing more than five pounds. Next, that a crop raised by means of the direct application of manure, contained more salt and gave more uncrystallizable sugar than when raised without direct manuring. A larger price, therefore, was offered for roots grown upon land which had been manured during the previous winter; a still higher price for such as were raised after a manured crop of corn; and a still higher price when, after the manuring, two crops of corn were taken off before the beet was sown."

Few plants are so deep-rooted as the sorghum. The roots have been tr to the depth of more than four feet; hence it would be inferred that the quality of the cane must be affected by the nature of the subsoil. This is found to be the case. Sandy or gravelly subsoils are most favorable for developing the pure saccharine properties of the cane. This, of course, results mainly from their affording drainage, carrying off the stagnant fluids which would otherwise remain in the soil surrounding the roots. This suggests the idea of underdraining, and in soils which are not naturally drained, underdraining is almost indispensable. It is very much more necessary with cane than any other crop. Professor B. Silliman, jr., in concluding a course of lectures upon cane culture in Louisiana, enforced the subject of draining in the strongest terms. He said that, "if called upon to give three rules which he regarded as most important for success in cane husbandry, the first would be drainage; the second, *drainage;* and the third, DRAINAGE." The conditions which affect tropical cane doubtless produce a corresponding effect upon ours, and the *rules* above given may be confidently commended to all who contemplate producing sugar from sorghum. It is hardly necessary to add, in this connexion, that deep ploughing, or, if convenient, subsoiling, is in order, and extremely appropriate for cane.

Cultivation should be thorough and frequent in the early stages of growth, but deep ploughing, or even working with the cultivator, should be suspended after the plants have acquired a height of three or four feet. The roots permeate the soil, extending quite across the rows, and when severed by the plough or cultivator the growth is arrested, and the cane acquires a premature and a dwarfed maturity.

TIME OF HARVESTING CANE.

Until recently the opinion has prevailed that cane for making sugar should be thoroughly ripe; that it could not remain standing in the field too long, provided it escaped the frost; but lately, this notion has been somewhat modified. The frequent occurrence of sugar in sirup of immature or unripe cane recently attracted attention, and was published. This called to mind numerous similar instances which had escaped notice until the subject was suggested, and these were multiplied in number until something like a case for early or premature harvesting was made out. The matter cannot, however, be considered as definitely settled until the results of the season of 1866 shall have been determined. Many will carefully test the cane at different periods or stages of maturity, so that, after the next year, it will be fully understood. The pre-

of maturity most favorable for the production of crystallizable sugar, ug to the new theory, is just after the seeds are formed, and before they to harden. As cane matures quite unevenly, it will be necessary, in accurate tests, to select stalks of uniform maturity, rejecting such as are iently or too much advanced.

In all es, when working for crystallizable sugar, the two joints of cane next ground, and two joints from the top, (besides the arrow,) should be rejected. cane should be cut close to the ground without removing the blades or the these, together with the two joints at the butt, to be removed as the cane worked. It would be best to allow but little time between harvesting and the cane, and on no account should it be stored and allowed to remain in large shooks. It is almost demonstrable that no cane sugar is developed any circumstances after the cane is harvested. The changes that occur the cane is cut, if any, must be in their nature depreciative, consisting in transformation of crystallizable to uncrystallizable sugar. The rind of the and the sheath surrounding the stalk will, of course, dry, if grinding is de-, and give off less crude sap; but if the purpose is to produce sugar, the point must be kept constantly in view, and all considerations which relate ly to the quantity of the uncrystallizable product must be disregarded. alone crystallizes, and this can be easily separated from or purged of any ities or offensive matters. So far as the crude matters oppose crystalliza- they are to be avoided, but the "cur ng process" is attended with more loss stallizable sugar than their presence in the juice would occasion.

GRINDING.

But little need be said upon this point. The mill should be absolutely clean, fragments of old bagasse left adhering to parts reached by the juice. If the is newly harvested and not thoroughly ripe, it will part with most of its e without very close pressing, and that which remains in the bagasse can ll be spared. Bagasse of green cane repressed affords a juice, which is not y sweet, but which is very green and offensive.

TANKS AND VESSELS.

These should be scrupulously clean, particularly with reference to any trace acidity. If filters are used, the arrangement of them should be such as to ep the straw or other filtering medium covered with juice while employed; d if emptied at any time, leaving the surface of wet material exposed to the he contents of the filter should be renewed. No ordinary condition is more ble for exciting vinous and acetous fermentation in cane juice than that l by the contents of a filtering vessel when emptied of juice and exposed air.

NEUTRALIZING AGENTS.

The use of alkaline agents in the juice of our sorghum canes is attended with s which do not follow when they are used in the juice of tropical canes. zing with lime is an immemorial custom in the tropics, and no sugar- would think of dispensing with it, or some full equivalent. The cause of rence referred to is not well understood. Our canes contain a greater e of glucose, and this has been named as a reason. It is true that forms a c pound with grape sugar, but it combines only a little less readily ane su r. This explanation is not satisfactory to any intelligent observer h non. Lime applied to sorghum juice in quantity sufficient to neu- e acid produces invariably a dark inky complexion in the sirup, and, to many, an extremely offensive taste.

Chalk or pulverized carbonate of lime is but slowly acted upon. Filt hot juice through a mass of finely broken limestone decomposes the carb slowly, but the quantity of lime appropriated is not sufficient to produce perceptible effect upon the acid of the juice. Calcareous clays have been with but little benefit. Carbonate and bicarbonate of soda and potash affect the color and taste of the sirup like lime, while they are less appropriate in other respects.

Bisulphate of lime is an acid. It decolorizes, assists in defecation, and serves in a remarkable manner to prevent every kind of fermentation. The quantity appropriate to be used is very small—so insignificant that no injurious effect can follow. One pint to a hundred gallons of juice is enough. The sulphurous acid which it contains is supposed to assimilate free oxygen from the juice, r thereby the active agent of fermentation, the sulphurous being converted into sulphuric acid, the latter combining with lime, forming the insoluble sulphate of lime which comes off with the scum. Probably but a small portion of the sulphurous acid is thus converted, while the remainder being volatile escapes in boiling, leaving a small quantity of free lime in the juice in excess of that required by the sulphuric acid. The objection urged against the use of bi-sulphate of lime is, that it renders sugar deliquescent. When first introduced and ployed in Louisiana, it was doubtless used in immoderate quantities. There hardly be an objection to using the small portions named above, and from very careful observation of its effects the writer is inclined to recommend it, particularly in operations conducted with reference to granulated sugar. Notwithstanding all that is said and all that is realized from the use of quick-lime in sorghum juice, there seems to be a necessity for employing it in sugar-making operations. The presence of acid in the boiling juice and sirup must tend to increase conversion of cane sugar to glucose, and there appears to be no adequate remedy but by the employment of a moderate quantity of lime.

It is, therefore, recommended, and, in combination with bisulphate of lime, to be used in the following manner:

The bisulphate should be introduced into the juice as soon as possible after it leaves the mill, and before it passes through the filter. One mode is to allow it to drop from a vessel, holding a measured quantity, into the stream of juice as it flows from the mill. If this cannot be conveniently arranged, it may be poured into and thoroughly mixed with the juice in appropriate quantities.

The quick-lime, having been slaked by immersion in boiling water, and having been thoroughly mixed with water to the consistency of milk, may be carefully added to the juice, the last thing before it goes to the pan. On no account should tempering with lime be undertaken without litmus paper to determine the effect as lime is added. After adding a portion of lime and thoroughly incorporating it with the juice, apply the litmus paper, and if the original color produced by the juice has been modified from a scarlet to a pink, approaching a purple, probably enough has been used. Complete neutralization of the acid should not be attempted. Clear lime water, in place of milk of lime, is sometimes recommended. Larger quantities are required to produce a perceptible modification of the acid, and if used in quantities sufficient to effect the object, the result is the same in all respects as if milk of lime were used.

GENERAL REMARKS UPON EVAPORATING.

The art of producing sugar from sorghum, while it depends upon every step in the progress of the work, from the selection and planting of the seed to the final operation of draining the crystallized sugar, may be said to hinge upon the process of evaporating; as it is in this that all the prudence and skill of the operator are required. This subject embraces, first, the means of separating the sugar from the impurities with which it comes associated; and, secondly, the

eans of expelling the excess of water without developing a dark color in concentrated sirup, or causing conversion of crystallizable to uncrystallizable ar. Processes for accomplishing both of these are known and in successful in large sugar-making operations, both with the beet and the tropical cane; they are expensive, complicated, and entirely beyond the reach of the rthern farmer, who produces his crop of sorghum as an incidental and gene- lly a subordinate farm crop. The question for practical consideration in this nnexion is, how shall the work of evaporating sorghum juice for the produc- n of sugar be accomplished by *simple and inexpensive means*, accessible to e ordinary farmer?

If cane juice containing crystallizable sugar could be *instantly* deprived of excess of water and the impurities which it originally contains, no appreciable nversion of sugar would occur, the solution would be colorless, and the cane would immediately crystallize out, in clear, bold grains, from which the rystallizable portion would readily drain. But the work of evaporating re- ures time, and when performed in an open evaporator under ordinary atmos- eric pressure, it requires a high degree of heat, the effect of which is, as has en stated, to develop color and convert crystallizable sugar. A dense viscid ition of the sirup is also produced by the same cause, which retards or ly prevents the crystallization of any cane sugar which may remain uncon- ed; or if the molecular attraction is powerful enough to overcome the ob- ions and a tardy crystallization is displayed, the viscid or gummy medium s to separate or drain from the sugar. The difficulties here referred to encountered in all sugar-making operations. They constitute the great and ersal impediment to the production of pure sugar from its various sources ature. It is to avoid or counteract these that vacuum pans, bone coal s, the desiccating, the refrigerating, and numerous other processes have devised. While these difficulties pertain to the juices of all plants worked r, they are most formidable in the juice of the beet and sorghum. The sugar enterprise came near being abandoned on account of difficulties of are here referred to, and its success was only established after the em- nt of extraordinary means, suggested by long experience and the highest ic aids, and these included with the abundant use of animal carbon and orating in vacuo. It should not, therefore, be surprising to any one ac- ted with the nature of our sorghum juice and its similarity to the juice of eet, that the production of sugar by the simple, and in many cases inap- riate, means has not been more frequent. By similarity, it is not meant he juice of the beet and sorghum are identical. The saccharine substance e beet consists more generally and more exclusively of cane sugar, while it ntains a greater proportion of earthy salts and other impurities. These are ndant that a sirup of beet produced by the simple process employed with um would be extremely offensive.

A description of the apparatus and processes employed in beet sugar factories, n the sugar houses of the tropics, would afford hardly a suggestion of prac- use in domestic operations with sorghum.

bone coal filter and the vacuum pan are the most appropriate means wn to man for producing sugar from its solutions; but they are not appro- and cannot be considered as having any place in this connexion, as they not meet the popular purpose which is intended to be subserved in this pa-

Conversion of sugar occurs, as has been shown, from *prolonged exposure of ution to intense heat*. Brief exposure to intense heat, or prolonged ex- s to moderate heat, is not attended with much loss or injury. The vacuum s upon the latter principle. Under a vacuum, boiling may be car- res much below that of boiling water; and this permits the in large charges, requiring several hours for its concentra-

tion. But the vacuum pan, which affords the means of boiling upon this principle, not being attainable by the sorghum operator, he must, if possible, accomplish the same end by the other method—that of brief exposure to its heat. If the excess of water in cane juice could be instantaneously expelled, the results would be as satisfactory as they are with the vacuum pan. But as time must be employed, it is obvious that the shorter the time the better will be the results. In considering the subject of evaporating cane juice in open pans, then, the following may be given as a maxim of universal application: Other things being equal, *that process which concentrates with the briefest exposure to heat is the best process.*

STEAM EVAPORATORS

These are used but by few operators in sorghum. They are no more economical than properly constructed apparatus worked by direct fire, and afford no advantage whatever except convenience and facility in controlling the heat. These are overbalanced by the great expense of apparatus; by the necessity of working in large batches enough to cover the pipes; and by the difficulty of discharging the finished sirup clean from the evaporator, a portion being necessarily left adhering to the pipes, which becomes candied by the heat of the metal, and must be cleaned off at some trouble and loss, or be left to impart a dark color and an offensive taste to the next batch.

"Steam jacket" evaporators have been used. Kettle-shaped evaporators, surrounded by a steam chamber, can be conveniently and securely made, and for many purposes these steam-heated kettles answer very well, but not for sorghum. They must necessarily be made to contain a considerable quantity of juice; then, the heating surface is insufficient, and the solution is exposed to a long, sluggish process of boiling, than which nothing could be more fatal to crystallizable sugar.

Steam has been applied to the bottoms of flat pans. This permits the heat to be applied to a shallow body of juice, and secures the rapid concentration of the quantity acted upon, but the difficulty of constructing the apparatus renders it expensive and almost impracticable. A pressure of steam sufficient to evaporate rapidly, when applied to the under surface of a flat metal plate, tends to produce an upheaval which must be counteracted by numerous stay bolts, so nicely and securely fitted as to remain steam-tight. Pans of this description have been constructed and found to operate well when perfectly made. They afford the only known mode of evaporating by steam adapted to making sugar from sorghum.

FIRE EVAPORATORS.

From the repeated reference which has already been made to the destructive effects of heat upon sugar juices, it might seem that the subject had received sufficient attention. It is, however, impossible to give undue prominence to this point in operations with sorghum, particularly in working for sugar. It is a matter of first and greatest importance. In considering the claims of evapo then, the most important question has reference to the capacity afforded reducing juice suddenly to sirup. Pre-eminent capacity in this respect pensates for inferiority in any and all others. Extra labor and attention, w of fuel, inconvenience of all sorts in an apparatus, may be endured. It fail to afford means of good defecation—even this may be submitted to; the juice is reduced to sirup so suddenly that the sugar is left intact, changed by heat, it will readily crystallize out of the solution, and can separated from the uncrystallized portion which will retain the impurities. if, on the other hand, the apparatus be faultless in all respects except t provides for working upon considerable quantities of juice at a time, or any other cause involves longer exposure of juice to heat and the

ersion of crystallizable to uncrystallizable sugar, the enterprise, so far as is concerned, is a total failure. The result may be a very clear, nice ip, but it will be uncrystallizable; or if not all converted, and a crop of puny stals appear, they will be inseparable from the dense and gummy medium which they are contained.

The importance of rapid boiling in small batches is recognized by all expeed operators in sorghum. All know that protracted, sluggish boiling ims an inky hue and a rank disagreeable taste to the sirup. It is not, however, so generally understood, or admitted, that the gummy, viscid condition of ie sirup, and conversion of cane sugar, is produced by the same cause. Some ven suppose that the yellow, waxy scum, which appears in the last stages of ling, is original in the juice, and by prolonging the boiling this may be, in a reat measure, brought to the surface and eradicated from the sirup. Yet no has ever found this adhesive substance to diminish in quantity as the boil; and the operation of expelling it is continued; on the other hand, the reful observer must notice that, in place of disappearing, it accumulates more idly than it is removed, and that this gummy principle is, in fact, a product he very means employed to expel it.

hen sorghum was first introduced, operators took counsel from the only ces which they could consult—the familiar modes employed in concentrating sap of the sugar maple, and the practice of the sugar-planter of the south. ast iron sugar kettles, of the largest attainable dimensions, were put to use, and e being deemed insufficient, many procured cauldrons made for the purpose, would hold several hundred gallons. The sirup resulting from these lable boilers disappointed expectation. It was dark, strong, offensive, and universal consent christened "*cane*-olina tar." Sorghum was regarded as a e by many, and the enterprise came near being abandoned. But experis with juice boiled in tin cups and basins on kitchen stoves had been incially tried by a few persons, and the results of these were so entirely differand the sirup so greatly superior to that which had been obtained by boilin large batches, that the theory of rapid boiling in shallow pans was sugd from many quarters, and universally adopted. The new revelation which thus made opened a hitherto unoccupied field for invention, and a great ude of "new and useful improvements" in sorghum evaporators immediappeared; and these, *propagating*, have continued to multiply with a sort g erative ratio of increase to the present time, the original key of shallow oration being preserved in nearly all. Two different and distinct modes of ow evaporation are employed. One consists in operating upon a batch or ge of juice, which is received into the evaporator either in the original green , or after being first defecated by a previous process, and is finished and k off in one body. The other consists in receiving either the green or ded juice continuously, in a small stream, into one end of the evaporator, and rging the finished sirup continuously from the other end, the juice being ntrated to a proper degree during its passage, and while in motion through an. The first is called the "intermittent process," and the other is called 'continuous process." Numerous plans have been invented and used for orating by the intermittent method. They all relate to economy in contion and in the use of fuel, or to convenience in management. Some of provide for receiving the green juice into large evaporators, where it is de-d, thence transferred to tanks or vessels, in which suspended impurities are red to settle, and thence to small evaporators, where it is finished. The of this mode of evaporating, when the operation is conducted for sugar, s y upon the quantity operated upon in the last stage. If very , and the boiling quickly performed, the conversion of crystallizable sugar be inconsiderable. The finishing pans should be thoroughly cleansed at of each strike. The settling process must receive particular attention,

as the juice, if allowed to remain in the tanks long after the temperature is somewhat reduced, is liable to ferment, or to undergo an incipient change, which, although it might not be perceptible in the quality of a sirup, might be fatal to the production of sugar. A more simple process, but much less perfect in its results, is where the green juice in a considerable body is taken into the evaporator, and directly boiled down to sirup. If the operation is conducted upon small charges, the conversion of sugar will be trifling, but in order to accomplish much work, large evaporators and large charges must be used.

The plan of boiling in a series of four or five small pans upon one furnace is used to some extent. They are each charged with a few gallons of juice, and placed crosswise upon the furnace, over the fire, and for some distance back over the flue. When the juice in the first pan over the fire is sufficiently concentrated, the whole series is moved or slid forward the width of a pan, which removes the front one from over the fire upon supports arranged to receive it, and leaves a space in the rear, which is covered by a newly charged pan. The pan of finished sirup is then emptied, cleaned, and charged with fresh juice, ready to take its place in the rear when another pan is removed from the front. Between the "intermittent process," according to any plan that may be adopted, and the "continuous," there is this specific difference: In the former the quantity of juice operated upon at one time must be sufficient to cover the bottom of the pan so deep that, even in the last stages, when the sirup becomes dense and sluggish, it will have sufficient volume to give it mobility, and cause it to circulate freely from one part of the pan to another; for if so shallow as to refuse to circulate, the parts exposed to the greatest heat, remaining undisturbed, will suddenly become unduly concentrated and burn upon the pan. By the continuous process the heat is applied, not to a body of juice at rest, but to a moving current or stream—each part being displaced or pushed forward by that which follows. The portion of the pan occupied by sirup in the last stages is small compared with the whole surface of the pan, and in this the sirup is k in motion or carried along towards the exit by the less dense sirup in the rear, so that the depth of sirup may be very shallow, and the whole time during which any portion of it, in its critical stage, is exposed to heat may be but a few seconds, or, at the most, but one or two minutes. Practically, the quantity of sirup acted upon at any one time, in the last or finishing stages, would be appropriately stated in gills, while by the "intermittent process" it would be stated in gallons, and the difference in time of exposure of dense solution to heat by the two modes is necessarily and inevitably about in a corresponding ratio.

Evaporators constructed to operate upon the continuous principle are of two kinds. One provides for the *direct* flow of the juice from the entrance to the exit end of the pan; and the other provides for an *indirect* flow, or the passage of the juice through narrow transverse channels back and forth, until by successive steps it reaches the exit end. In the first the whole width of the pan is the width of the channel through which the juice flows, and this plan does not provide adequately for the successive displacement and advancement of all portions of the juice. The less concentrated portions may find their way along, and appear in advance of, the more concentrated portions, mixing therewith, occasionally producing a complete mixture of green juice and nearly fini sirup. Cross-bars or ledges with gates, or provided with openings for an derflow, are generally used. These hold back the green scum, and prev n from flowing down, but do not wholly restrain the green juice from advan prematurely.

By the transverse or indirect flow the juice is confined to channels but a inches wide, and all must pass through the same channels, each portion be exposed to the same heat, each being displaced by the portion which follows the same time displacing that which is in advance. At the side of the n leaves the channel which it has traversed, and enters the next in advance, th

t returns to the other side, thus flowing back and forth through the whole ıntil it reaches the last channel, where, if the flow has been properly ›d, the juice will have been fully concentrated, and may escape from the ›ugh the exit spout. At the centre of the pan, in each channel, the exposed to the greatest heat, and will there boil violently ; at the sides ing will subside, to be renewed again at its next transit. The juice is subjected to an alternate boiling and subsiding operation, which is most le for the separation of impurities, these being cast up more abundantly, ases, at the moment fluids pass from a state of rest or subsidence into

:ontinuous transverse current process of evaporating was discovered by M. Cook, of Mansfield, Ohio, and it is believed to be the best plan for ting sorghum juice that has yet been devised. It meets all the requiref the business ; that is, it affords the means of obtaining perfect defeca-l enables the juice to be concentrated with the briefest exposure to heat, t the same time economical and convenient. The occurrence of sugar ghum has been almost exclusively in cases where the Cook sugar evap-as been used. A very large proportion of all the sugar made from sor-ıs been made by the use of this apparatus.

regard to the facilities for defecation afforded by the different evaporators ›thing need be said. All provide for removing the scum, and the differ-es provided are commended more by fancy than any intrinsic difference, :he process of Mr. Cook is believed to produce a better separation of im-than when the boiling occurs without the interruptions which he provides. en working for sugar, the defecation of the juice is, as has been said, mportance than rapid concentration.

ıot considered necessary to refer to the modes of working the different tors, as all information required is furnished by the circulars of manu-ı. An attempt has been made to explain only the leading features of rent systems of evaporating, with particular reference to their adaptation 'ork of producing sugar from sorghum. The reader, if satisfied that :ulties to be encountered in the operation have been correctly represented, ; little difficulty in determining from a general description of the differ-:ms of evaporating, which is most appropriate to the work.

CLARIFYING SIRUP.

:erm properly applies to an auxiliary process employed upon the semi-ile in progress, or upon sirup which, being once concentrated, is afterward with water and treated anew. For making sugar the shortest and most roce:s from juice to sirup is the best, and will result in the greatest , and in the best quality of sugar. Reducing sirup with water, and sub-t to treatment in connexion with, or followed by reboiling, involves, of ı new exposure to heat, and is obnoxious to all the objections which :n so often referred to in connexion with boiling. There are no means ıt known by which sorghum sirup can be made more readily crystalli-an it is when boiled down direct with proper defecation, except by with bone coal, which, not being practicable on a small scale, cannot be :d as an appropriate subject in this connexion. Numerous processes :u invented, patented, and sold for effecting the crystallization of sor-'up, and hundreds of thousands of dollars have been paid for them by and over-credulous operators; but not one of the many which have the knowledge of the writer contains a single new and useful suggestion, ›st of them betray the most profound ignorance of the art upon which ıtees profess to have made improvements. Nine-tenths, and probably all the sugar which has ever been produced from sorghum has occurred

through the direct and ordinary means employed for making sirup, and g without any purpose or expectation on the part of the operator that tl would granulate, or, in ordinary language, "turn to sugar." The result c from the accidental and unpremeditated compliance with all the condition sary for the production of sugar. These conditions are all that are req making sugar from sorghum, and *none of them are patented*, and no p invention will supply their place, or compensate for non-compliance with

FINISHING POINT.

It is difficult to give particular directions upon this subject. The sug very readily acquires familiarity with the appearance of sirup in its last and can determine the density it has attained by the manner of boiling, by the peculiar appearance and sound emitted by the steam as it escap the boiling mass. As it approaches the finishing point, the steam is li in lively puffs, with a slight noise; gradually the sirup becomes more sl and the steam seems to break away with more difficulty; still later, tl subsides somewhat, and the steam escapes with a more sharp and ang at the same time the sirup assumes a glistening, some say a "sugary" ance. This is generally regarded the finishing point for sugar. With s sirup it is better not to be too dense. The stage before the last above dc is more appropriate. The sirup, after being removed from the fire, is dis into coolers, and should then be reduced in temperature, by any app means, as rapidly as possible, at least as low as to the temperature o Some practise stirring or agitating the sirup violently in the last stages ing, and for some time after being removed from the fire. The first fa the escape of steam, and preserves a lower temperature by several degree boiling sirup, which is an important advantage A plan of evaporating, is called "low temperature," is effected by rotating a series of disks, part merged in the sirup, which brings up and exposes a large amount of su the air. This is a systematic plan of "agitating" boiling sirup, and the is regarded as an improvement. When working by the intermittent or " system it is an advantage to stir from the bottom of the evaporator, as it the naturally sluggish circulation, and prevents portions of sirup from re too long in contact with the heated bottom plate. Agitation long co after the sirup is removed from the pan, produces a foamy state of th mass, which is probably a mechanical condition favorable for granulation, this condition is generally sought to be avoided in tropical sugar-making

GRAINING.

If a special effort has been made for sugar, it should not terminate w sirup has reached the cooler, but be continued to the end. When it is venient to establish a room for graining, the sirup may be put into barr placed in a cellar, or room, where the temperature will be even, and as w can be secured. Granulation *may* occur in a few weeks or months. Oc stirring or disturbing the barrels will be of advantage. Many sirups wil ever, fail to show any signs of granulation under these circumstances would, if otherwise treated, afford a large display of sugar. The imp grain must be very strong when it manifests itself, as it often does, in s rups tightly barrelled, and taking all the chances of temperature whi befall it.

properly constructed room for graining is an important part of the o ugar making, and no operator in sorghum should complain of failure uce sugar who has not employed a graining room, or specific means eq perate to secure granulation The room may be of any convenient dim

angement, provided with places to bestow the sirup, and the means of · *and preserving a uniform temperature.* The following plan will be convenient, or it will at least afford the main features or elements required, able the operator to construct understandingly, with such changes or va- as his own ingenuity may suggest. It may be constructed as a "lean- nst the side of some other building, or it may be partitioned off from the of the sugar-house or other building. For a room to contain twelve or barrels of sirup, let the dimensions be eight by twelve feet on the inside; t as close and impervious to air as possible. Arrange all along on the des, stands for drawers, which are to be forty inches long, twenty-four wide, and three inches deep on the inside; the drawers to have their in the stands one above another as high as convenient, say six feet, and e a space of two inches between each. This will give for each drawer a of six inches, and each stand will accommodate twelve drawers. Allow ee stands on each side of the room, six in all, and the room will accommo- venty-two drawers. Each drawer can be filled with sirup to the depth inches, when it will contain about eight gallons, or for seventy-two , five hundred and seventy-six gallons. Place in the room a good air- ve, which, upon being supplied with large wood, will give off a regular without renewal, for twelve hours. If the room is made very tight with or paper, an auger hole may be made near the floor, and another near or the room for ventilation; but it is rare that any special provision for ion will be required. There is much more danger that the room will not be sufficiently close, and will be allowed to cool off frequently in the inter- replenishing the fire. The sirup, as soon as cooled down to a temperature , may be conveyed to the graining room, and deposited in the drawers, a full supply to each, or a small quantity to be added afterwards. While awers are being filled, and as often as convenient afterwards, the sirup e stirred. For this purpose use a wooden instrument, formed by a rod of length, say thirty inches, with a wooden blade nailed across the outer ng a T. It can be worked conveniently without moving the drawers, two inches of space provided between them affords room. The tempera- the room should be raised, and kept as near as possible between 90 and It will do no harm if the temperature falls for a few minutes—while the open, or the operator working in the room—as the temperature of the will not be sensibly affected by a temporary change.

the time the last drawers are filled, *it is hoped* the sirup in the first will ecome well granulated, or resolved into "mush sugar," when the drawers emptied and again filled with sirup; but if granulation is not supposed omplete, and it is thought best to give more time, store the sirup which e made while the drawers remain thus occupied, in any convenient place, thout any attempt to effect its granulation until it can be transferred to aining room, as nothing would be gained.

DRAINING OR PURGING.

is the last and not the least difficult operation to be performed. The with which the uncrystallized portion of the mush or "rough" sugar can arated from the solid grains will depend much upon the success which ended all the previous operations. If the cane was good, if the evapora- as conducted without the development of an undue quantity of that tena- gummy principle which is the great obstacle to the work of draining, and g ulation occurred without too much time in the hot room, then the will be attended with little trouble. The more quickly sugar grains, re y and perfectly it can be purged. If considerable time is required, y the mass is exposed in open vessels to warm temperature, the

uncrystallizable portion becomes condensed by desiccation, and may be rendered almost solid; in which case it is impracticable to separate the sugar without reducing the mass with warm water, and this is necessarily attended with the dissolving of a portion of the solid sugar.

Many different modes of draining sorghum sugar have been suggested, and several have been patented and extensively sold through the country. In connexion with these, a great number of (so-called) processes for "making sugar from sorghum" have been introduced. Enormous sums have been paid by producers for these so-styled "processes." Space will not permit them to be referred to separately, but this paper would be incomplete if it failed to warn sorghum-growers, and all who are interested in the subject, against the absurd pretences and fraudulent practices of these peddlers of "rights" for making sorghum sugar. Not one of the processes for making sugar from sorghum, or for draining sorghum sugar, which has been patented and sold since the introduction of the plant, contains a single essential element of novelty. All, without exception, consist of either slight and immaterial variations from processes which formerly existed and belonged to the public; or, if they present elements of novelty in the form of agents and substances not formerly used, they are, in all cases, not only non-essential and useless, but often absurd, and not unfrequently positively injurious. And yet for these miserable pretences sorghum-growers of the country have paid, at a moderate estimate, not less than *four hundred thousand dollars*. This is not the place to explain how it is that patents are obtained for trivial and useless inventions. It may, however, be remarked that a large proportion of all the patents issued are for really worthless inventions, or for trifling and unimportant modifications of that which was formerly known. But a patent covers only that which is found by the office to be *new*, and this may be an immaterial part of all that the applicant describes in his specification. An old and well-known process may be changed by adding another element, or slightly modifying those which formerly existed, so as to produce a new process, but the change may be no improvement—it may produce no difference whatever in the effect; still it is a new process, and the applicant, if he swears that he believes his alleged invention to be "useful," is entitled to and can claim letters patent for it. The letters patent, however, cover, as has been said, only that which was new. They cannot deprive the public of that which was formerly public, and cannot give to a patentee anything more than he has *invented*. This brief explanation seems to be required in this connexion, as the opinion prevails somewhat that the broad seal of the Patent Office granted to an inventor implies that the august head of that department, and the entire government through him, certifies to the great value of any patented invention, and to the truth of all the patentee has been pleased to say about it. This popular superstition is of great service to dealers in worthless patents, for it predetermines a thing patented to be new and valuable, and this causes purchasers to neglect to examine and scrutinize the merits of an invention.

The operation of draining should always be performed in a warm ro and the temperature of the sugar to be drained should be about blood heat, u u be brought to that temperature slowly without the application of fire directly the mass. If sorghum sugar crystallizes out of a solution not very dense and waxy, it may be transferred to moulds for draining. These may consist of vessels of any convenient size and shape. Cone-shaped vessels are most commonly used. The arrangement of them should be such as to allow them to be filled, and, after standing a few hours (perhaps days) until the sugar "sets," a can be withdrawn from the bottom to allow the molasses to come off. It will frequently happen that molasses refuses to separate from the sugar. When the plug is withdrawn, both come off together. This mode of draining can only be applied to sorghum sugar under the most favorable circumstances. It will

rely present itself in a condition to be thus treated, and other means must be sorted to. Among the many which have been used are the following:

Place the mush sugar in a coarse cloth or bag, and suspend it until the mosses drips away. After the dripping ceases, the sugar may be thoroughly ixed with a very small quantity of water and again hung up to drain; and iis may be repeated, if desired, until the sugar becomes nearly white, though ie operation will be attended with some loss of sugar by dissolving. Another iode consists in enclosing the mush sugar in bags and subjecting it to pressure. ifter once pressing, the sugar may be mixed thoroughly with a small quantity f water and re-pressed, repeating as many times as may be necessary or deirable. This is a very old process, but, like many other old processes, has een *re-invented*, and "rights" to employ it have been extensively sold. The iost appropriate and effectual means of draining sorghum sugar is by the cenrifugal process. This has been used in the tropics for many years, and is an ld process, although it has been made the subject of several new patents for o-called improvements, and an attempt is made to establish a monopoly of the ight to drain sugar by centrifugal means. It is a public right, and any ordinary :hanic can construct a machine, on a small scale, adapted to the work. The :hine consists of a cylindrical screen, carried usually by a vertical shaft reroi at a high velocity. The speed should be nearly as great as would be ippropriate for a circular saw of corresponding diameter. An outer case surounds the screen. The mush sugar is placed in the screen, either when in :ion or at rest, care being taken to distribute it evenly around upon all sides. ine sirup or liquid portion is caused to force itself out through the meshes of he screen by the centrifugal action, and is caught in the outer case, from which t should be conducted away by a spout. A small machine, with a screen welve inches in diameter and six inches deep, can be made to run by hand, hough the speed must be high, and the work of draining by hand is necessarily rious. The quantity which a hand machine is capable of draining in an r depends upon the condition of the sugar. Two or three times as much ower is required with sugar in one state as in another; and sometimes it is ound impossible to produce any separation by the centrifugal, without adding derable water and greatly reducing the viscid, adhesive medium in which sugar is contained. It is perhaps safe to say that with a light-running d machine and a fair quantity of mush sugar, from fifteen to twenty pounds ary sugar per hour may be produced.

CONCLUSION.

The production of sugar from sorghum has been much retarded by a false on on the part of many, that it is to be accomplished by some sovereign ific, which is to *make* the sirup crystallize. This has led producers away pretentious patent processes, to the neglect of a careful attention to every in the operation, which is the only certain means of success, and without h nothing else is of any avail. It should be understood that sirup fretly contains no crystallizable sugar whatever, and to produce a single of true sugar from such sirup transcends all arts of man's device. Carbon een made to crystallize and afford artificial diamonds, but no man has ever ceeded in making a grain of artificial cane sugar. It is developed alone the great laboratory of nature, and all that art or science can do is to preserve paired, and separate it from excess of water and the impurities which act granulation. It will then crystallize, when reduced to the proper tem-, without the employment of any "process" or extraneous aids what- Sirup often contains so small a portion of crystallizable sugar—that is, nute atoms of sugar are so far separated, that they are not attracted to other; in which case crystallization cannot occur. Sorghum sirup gene-

rally contains a dense, viscid substance which obstructs granulation. This can be removed; but the only effectual means of removing it is by filtering it through a liberal quantity of freshly burned bone-coal—a means which cannot be considered practicable with the mass of farmers. But it can be, in a great measure, avoided or prevented from occurring; and this, together with the means to be employed for promoting the development of cane sugar in the plant and preserving it unimpaired constitutes the whole art of "making sugar from sorghum." It all consists in strict compliance with the conditions imposed at each step in the operation, from the selection of the seed to the final act of purging or draining the crystallized product. It is not to be accomplished by any magical or sleight-of-hand process. There is absolutely no "royal road" to sugar.

THE GRAPE DISEASE IN EUROPE;

ITS

ORIGIN, HISTORY, PHENOMENA AND CURE.

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The grape disease being with us a growing evil, threatening the total destruction of some of our native American varieties of vines, like the Catawba, I have deemed it important to give a brief history of the destructive malady which has prevailed of late in European vineyards, hoping it may to some extent aid in understanding the character of diseases of the grape which are beginning to prevail in this country.

The literature upon the subject of grape disease is meagre. The books consulted in writing the following article were, principally: *Louis Leclerc, Les vignes maladé*, report to the minister of the interior, Paris, 1853. The plates annexed were copied from this report. Dr. H. Schwartz, Chemie und Industrie unserer Zeit; Breslau, 1862. Dr. W. Hamm's Weinbuch, Leipzig, 1865. Marès diseases of the wine stock, in "Memoires de la Société Impériale et Centrale d'Agriculture." An extract of the above, in Journal de Pharmacie et de Chemie, Mai, 1857, p. 355; also, in Dingler's Polytechnisches Journal, Bd. cl., 1858, pp. 148–153. J. T. A. Barral: Cure of the vine disease, with instructions how to apply sulphur, and figures of the apparatus, from "Extrait du Journal d'Agriculture Pratique," No. du 20 Juin, 1857. Paris, Librarie Agricole de la Maison Rustique rue Jacob, 26.

The year 1845 will ever be a painfully memorable one, by giving birth to two new diseases which threatened the entire destruction of the potato and wine crop, and which caused suffering, devastation, and pecuniary ruin to an incredible extent on the continent of Europe.

It would require a great deal of space even to allude to the different theories and opinions advanced as to the cause of these diseases. Suffice it to state, that time has proved the majority of them to be fallacious. All such as imputed to peculiar electric conditions, a wet season, or other meteorological influences, and in seasons remarkable for dryness, are manifestly refuted, whilst the gradual accumulation of scientific facts has established, almost beyond dispute, that the potato and wine diseases are not only accompanied by, but result from, fungus or mouldy growths. Limiting our remarks here more particularly to the wine disease, we begin with its

HISTORY.

In the spring of 1845 this disease was observed for the first time in Kent ngland, on vines raised in the hothouse of Mr. Tucker. The termination of ie young shoots assumed, first, a crispy look, began to wither, and then dried p. The unripe grapes were next attacked, becoming covered with a grayish 'hite bloom, destroying the skin of the berries, and causing them to rot and dry p. This fearful disease spread itself speedily over other English grape hotouses; was observed almost simultaneously in like establishments at Paris, nd passed thence over France, Italy, Greece, Tyrol and Hungary, affecting omewhat later and more feebly the vineyards on the Rhine. Rev. M. J. erkeley, of Bristol, an eminent naturalist, who has devoted his life to the study f these minute organisms, was consulted, and diseased grapes submitted to his xamination. He at once ascribed the cause of this injury to a new species of he botanical genus *Oïdium*, a vegetable fungus or parasite which, in honor of the orticulturist at Margate, he termed Oïdium Tuckeri. The genus Oïdium esablished by Link, belongs to the agamous plants, and is included in the Muceineous family, (moulds.) It is described as a vegetable parasite preying upon ving plants, like lice and other animal parasites upon animal species. At first nis mould forms webby creeping filaments known in botanical language as Myelium. These root-like fibres then branch out, sending up straight or decument articulated stems. These bead-like joints fill up successively with seeds r spores which are discharged at the proper time to multiply the species.

EFFECTS OF THE PARASITE UPON THE VINES.

The first effect is generally perceived upon the leaves, which, at their vernal rowth in vineyards, turn whitish, owing to the development of mycelium, (see late I, Fig. 4*a*,) creeping first over the superior leaf-surface, constituting a feltke mass, visible plainly under the microscope alone, then invading the whole af with rapidity. Sometimes the diseased leaves remain green and smooth, appear spotted. The spots differ much in appearance, and may be dirty wn and scarcely circumscribed or confluent; sometimes they are black, cove and there the natural white down of the lower surface of the leaves, ra to the variety of the vine. At other times the leaves crisp and curl p unde he effect of the parasite, then fade and dry up, or turn black from the e to the circumference, and, lastly, drop off, from the latter part of July to beginning of August.

At this stage the vine is in a state of consumption—for the leaves are to lants what the lungs are to animals—and the functions of life are being susended at the most important period of growth. The mycelium developing n leaves produces relatively but few branches with seed capsules (spores,) s, when growing upon the berries of the grape, these are very numerous. the shoots are attacked by the disease they are covered with spots of a e diameter, or with large, irregular, often confluent blotches of a reddishwn or even black color. (See Plate IV, Figs. 1 and 2.) Generally the s preserve their primitive color, even after the August sap.

In the most affected vineyards the shoots look as if burned in different places, r as if a red-hot iron had been applied to their herbaceous surface. In several es the took place on the petioles (stems) of the leaves, and on m (ste) or the bunches of grapes. At times the shoots may be to a clammy inodorous fluid all over their surface. The living the power to penetrate into the young wood to the medullary w nit of the woody texture turns black and dry, and withers f its length.

ed by the affected grape are more variable. During

the first invasion of the oïdium, sometimes before, sometimes after its appearance on the leaves or shoots, a single whitish spot may be seen on a single berry, enlarging itself by radiating in irregular directions. The mycelium, with its fructifying stems, is limited or arrested, at times, in its growth, from some unknown cause; whilst, at others, it is seen spreading with great rapidity, covering the entire surface of the berries. If in a bunch there is but one abortive berry, it will bear marks of the disease. The creeping branches of the mycelium are fixed upon the skin of the berry by rootlets which do not penetrate into the juicy pulp. The mycelium sends up vertical fructiferous branches nearly of the same height, and densely pressed against each other, velvet-like. These branches are composed of, or subdivided into, transverse cells, (see Plate I, Figs. 1 and 6.) The top cell increases in volume, becomes ellipsoidal, and detaches itself at maturity, or is carried off by the slightest motion of the air. If the conditions (*i. e.*, the temperature and dampness of the atmosphere) are favorable, a second and third cell will follow the same course, (see Plate I, Fig. 2.) These cells, called spores by botanists, correspond to the germs, buds or seeds of the higher orders of plants. The more or less elongated spores of the oïdium mould form capsules, consisting of two transparent integuments or skins. The spores are almost devoid of weight, and so small that their length only amounts to the $\frac{1}{300}$ or $\frac{1}{500}$ of a millimetre, or $\frac{3}{10000}$ to $\frac{7}{10000}$ of an inch, English measure. As soon as the deposited spore is favored by circumstances (*i. e.*, a moist atmosphere and a temperature not less than 15° C. or 59° F.) it germinates. A sort of irregular bud (Plate III, Fig. 2, *c*) bursts forth at one of the ends or poles of the ellipsoid, elongating itself into creeping, webby fibres, which, at length, developing themselves into a net work of branches, form the *mycelium*. But the oïdium has yet another way of propagation, or revivifying as it were. If the mycelium is reduced to dry, inert, and almost imperceptible fragments, it constitutes, when placed under proper conditions of warmth and moisture, a true *cutting*, which soon sends forth two or three creeping rootlets, (see Plate III, Fig. 2, *d*.) These will produce vertical fruit branches, discharging successively the ripe spores, as has been already described.

The first effect observed of the *mycelium*, when adhering to the surface of the berries, consists in producing elevated, brown, (rarely red or black) points, unless they be certain varieties of grapes attacked toward maturity. Louis Leclerc, in his report to Monsieur le Ministre Persigny, remarks: "Certain learned physiologists, for whom I have perfect deference, entertain the opinion that these elevated points on the berries appear before the formation of the *mycelium*. Constant observations, extended for over three months, have failed to reveal to me a single example of such a phenomenon." Suppose this to be so, are these slight elevations the result of a developing internal sporule, or of the removal of the mycelium? Such apparently trifling facts are of great importance. The appearance of these elevated points before the oïdium proves that it is a pre-existing disease—a kind of eruption. These excrescences or round swellings (Plate III, Fig. 1, *a*) seem not to penetrate the pellicle, and consequently do not extend into the cellular tissue constituting the pulp of the berries. The excrescences, at first very indistinct, proceed, nevertheless, in irregular lines, according to the direction taken by the sterile base network of the mycelium. The elevated points are readily seen by the naked eye, by wiping off the oïdium with the finger, or when the latter is removed by some unknown cause, (Plate IV, Fig. 5.) These points are indelibly traced, whether they cover the whole berry, or are distributed in isolated patches; and it is always upon one of these punctuated lines, and longitudinally, that the pellicle of the berries opens. The berries themselves afterwards burst, owing to the weakness of the skin, or the great accumulation of the nutritive juice within. (Plate IV, Fig. 5.) The cellular tissue forming the pulp is next torn, leaving the seeds naked.

ie berry dries up or rots, according to the state of the atmosphere and the ›re or less advanced stage of the fruit. The berry does not always open in aight lines, sometimes not at all. In the latter case, the fissure in the skin .ks in, forming a furrow, at the bottom of which is sometimes found a bluish greenish blue fungus, which is not the Oïdium Tuckeri.

The berries infected with Oïdium Tuckeri do not necessarily split or burst en. Louis Leclerc has witnessed them in five other conditions: 1. Simply thering, with transient softening and final dryness. 2. When the berry is ly half developed the growth is arrested. 3. In spite of the enemy the ›wth continues until one-half to even three-fourths of the normal final volume reached, when the berries wither and putrefy. 4. The berry down to the dicle or stem is completely covered by a dense, thick, brownish or reddish ?er, composed of the accumulated webby threads of the desiccated *mycelium,* what of a woody appearance, with none or but few fructifying branches. tnis case the coating may be removed by a sharp instrument, and still the llicle beneath look perfectly green, and the interior of the berry be in good ıdition. 5. Finally, and most strangely, the berries from their formation are ?ered one-half, two-thirds, or even wholly, with mycelium and numerous fertile ; still they grow, soften, attain the normal size, and mature perfectly.

CIRCUMSTANCES FAVORABLE TO THE INVASION OF THE DISEASE.

From England the disease passed, in 1847, over the English Channel, and ame visible in hothouses near Paris. Thence it spread over the vineyards neighboring districts, and travelled with increased violence over the south of ince, Italy, and Hungary.

.n 1853 spores of the oïdium crossed the Mediterranean to invade Algeria, ria, Asia Minor, &c., destroying a most important article of commerce and ıing the cultivators. Happily the disease seems to have yielded to science human labor combined; when the oïdium had been submitted to the scrutiny cience, which investigated, named, and classified it, the question was earnestly ed whether this disease was the effect or cause. It is still disputed. Likee, whether the vegetable fungus or mould, called yeast, is the primary agent tarting alcoholic fermentation, as in the manufacture of wine or beer from ary liquids, or whether these vegetable cells, or yeast, are a secondary pro›n, collecting, (owing to the decomposition of organic materials,) as higher ›r of fungi collect, on dead leaves and decaying substances generally.

'o return to the grape disease. Was the oïdium parasite a new plant prely unknown, which installed itself on a higher order of plant, as the grape› when it is in full vigor and in a normal condition, there to germinate, ›agate, and live, by preying upon the tissues and sap of the vine; or was this ible evil brought about by an artificial, forced culture, causing deep-seated ration or disease in the vine, the oïdium fungus or mould prospering while ase or decomposition invaded the vine living under entirely unnatural condis? These two opinions advanced by naturalists do not appear entirely settled. earching with due care for the circumstances which favor the invasion of disease, it has been remarked, in many different localities, that it is developed cipally in rich, low, and moist soils. These are generally infected first, and red by a warm and damp atmosphere, the multiplication of the oïdium es is indeed enormous and may be counted by millions. The wind raises ı up in clouds and distributes them everywhere, even over elevated vineyards. › dissemination of seed spores occurs at a period the most dangerous to the - the stem and fruit being in a transition state, and very delicate and susle.

ıew remarks in regard to the tendency of forced or hothouse culture, as as of the domesticity of animals, may not be out of place. The mass of

mankind are apt to find nothing good in nature but what conforms to their interest. Thus we resolutely assume that animals or plants are ameliorated and improved in consequence of an artificial life inflicted upon them, termed culture or domesticity, which must contribute to our wants, tastes, and even fancy. But these animals, whose muscles and fat ingenious man steadily increases at the expense of the bony tissue; these plants, whose fruit by the care of man increases in size, softness, juice, and flavor, are they truly perfected for their good?—these unnatural, perverted beings, so to speak, whose certain organs enlarge themselves enormously, while others growing more and more delicate and impressible, either perish or become abortive, and are exposed to disease which their wild congeners never contract. Plants do not grow spontaneously and multiply themselves in all soils. It is only under favorable circumstances that particular species can flourish. The *Vitis vinifera*, or European grape, will grow on this continent (so varied in soil, climate, temperature, &c.) in California alone. And I am informed by my distinguished countryman, the California pioneer, General Sutter, that he successfully raised upon his farm a great variety of trees, shrubs, and flowers peculiar to Europe.

The geographical distribution of plants (*i. e.*, the locality of their proper existence) seems to be determined not so much by the variety of soil as by the intensity of the solar forces, light and heat, and the degree of moisture, all of which are imitated in our greenhouses, where we are wont to grow plants of all zones.

An impressive illustration of the almost marvellous results gained by a successful artificial imitation of the conditions required by different species of plants for their maturity may be seen at Zwickau, in Saxony. Upon a spontaneously burning subterranean coal strata an intelligent gardener built extensive greenhouses, in which the air is saturated with moisture, and wherein reigns, in all respects, a truly tropical climate. Here the sugar-cane and coffee plant can reach their full development. It is said that the owner sells his large crop of pineapples, alone, for 3,000 Prussian dollars annually. Cucumbers, beans and melons ripen within this magic circle at all seasons of the year*.

When the plant is placed in circumstances not of its own selection, and left to itself, it disappears, and wonderful artificial contrivances only can maintain it. Then it acquires new qualities at the expense of conservative forces, which the genius of cultivation can never supply. The altered plant can no longer surmount the obstacles offered by the immutable physiological laws of geographical limitation, and the slightest occasion may suffice to induce the destruction of this artificial being. Comparisons are generally bad evidence, but certain connexions presenting themselves may, nevertheless, throw some light on a questionable matter. Count de Gasparin states that the silkworm is now only found in the protecting hands of man, who has altered, if he has improved it. The fact is, says Boissier de Sauvages, the domesticated silkworm has become so stupid that, when placed upon a mulberry tree, it will often gnaw off the stem of the leaf upon which it crawls, and then fall from the tree, up which it is never able to climb. A common caterpillar will never act in this silly way, and if the wind should blow it down to the ground it climbs up rapidly again to its selected home. The silkworm, as modified by art, will reach its fifth period of transmutation, be lively, healthy, and so great a glutton, that, relatively to its bulk and weight, it devours as much food as thirty-six horses, when, alas! our fine silkworm quivers, twists itself in painful convulsions and dies. What is the cause of this sudden disease? It is occasioned by an agamous parasitical plant—a fungus or mould called by scientific men *Botrytis bassiana*, and by the cultivators of the silkworm "muscardine" and "gættino." Any one can verify this fact by rubbing a silkworm with a camel's hair brush previously brought in contact with the spores of this cryptogamic

*Die Schœpfung, by Hugo Reinsch, Erlangen, 1856, p. 32.

ınt. It is estimated that in France, alone, the loss occasioned by this disease ıounts to twenty million of francs, or 3,960,000 dollars. When, where, and w it first originated, no one knows; but it seems very probable that circumınces similar to Tucker's hot-bed culture gave rise to it. The people first ;ributed the phenomenon to witchcraft.

In this connexion I will mention circumstances that came under my personal servation, showing how, sometimes, unexpected causes contribute to the rapid unexplained formation of fungi or mould. In a village near Zurich, some 7 years ago, great excitement was caused in a farmer's house, where every ucie of food containing much starch, such as potatoes, flour dumplings, and rice, rned red in spots when brought to the table, as if sprinkled with blood. A ighboring family was charged with wickedly causing this trouble. So great came the excitement and popular prejudice against the accused, that the police the matter investigated. Experiments confirmed the truth of the supposed ood-stains appearing upon cooked starchy vegetables, and the cause was traced a sewer passing under the kitchen. It was probably the parasite known as "bloody wonder," *Prodigium farinæ*, on account of which many, in a superıtious age, lost their lives. According to Ehrenberg—who lately succeeded ecting in like manner boiled potatoes, dumplings, cheese, and bread—these spots are not the result of a fungus or mould, but are microscopic animalculæ, voluntary motion, and are termed by him *Monas prodigiosa*. In 1821 this omenon was quite general in the Rhenish provinces. We should not be ed if the potato mould, *Botrytis (peronospora) infestans*, which made appearance as far back as 1842–'43, both on the continent of Europe ın North America; the parasite *Oïdium Tuckeri*, which, from 1847 to 1860, ed the grape vine, and the *Brotrytis bassiana*, a plant of the same family, ıch threatened to ruin sericulture, by boring itself in the living silkworm, oved to be the same parasite, modified by characteristics depending upon cumstances and the difference of organisms upon which they prey.

To return to our proper subject: M. Gontier, of Montrouge, France, a dished horticulturist, stated before the National Central Agricultural Society tne "*Frankenthal*" (gross-race or Trollinger) wine stock seemed to be rily selected by the oïdium to feed upon. It has always been first observed u variety by Tucker and others, which shows that no other would more degenerate by forced culture.

ıt Babo, a German wine-grower of great authority, declares that the Gerhave committed the blunder of planting the "Frankenthal" grape in situıns not appropriate for it, such as moist grounds, &c. But what is such a ke, after all, when compared with a house heated by stoves, and filled with ating damp atmosphere—a condition fulfilled in the art of horticulture rder to yield fruit in winter, and termed *forced culture?* Does not the cultiion of the grape from shoots raised in hot-houses point out the road followed the grape disease? The oïdium was not traced first upon the wild grape, or rous American varieties, on table-land, or on dry steep declivities. No; i established itself in an English hot-house; from thence it penetrated like hments in the neighborhood, and, acclimating itself thoroughly, next ed the artificial vine arbors in the open air. Thence it found its way into vineyards, and was spread by the wind in every direction. In this country Catawba grape seems to be the only variety that has suffered by the disease, l is threatened with ruin at no distant day. The horticulturist has a striking nce indicated to him in the longevity of peach trees raised from seedlings ı rom buds. The ancient way of propagation furnished healthy and vigors, which (although coming to maturity more slowly) often reached the ctable age of fifty years; while according to the second method, trees barely ı tl ı ıth year without being attacked by disease and decay. Before finally the remedial agents employed successfully against the grape disease,

we will give briefly a few statements of the ruinous extent to which it prevailed. The following prayer, ordered by the bishop of Montpelier, France, to be read in all the churches in the diocese, may convey an idea of the terrible ravages of the disease. The following is the translation:

"We pray Thee, O Lord our God, that Thou wouldst deign to regard the vines with kindly eye and propitious countenance; and that Thou bestow upon them Thy blessing, that neither the terrible consequences of Thy wrath, nor any noxious disease devour them, but that unharmed and full of delight the fruit be conducted to a perfect maturity, and happily preserved for our use."

Its prevalence in Madeira, where, probably in consequence of the isolation of the country, it did more damage than anywhere else, is thus described in the report of Dr. H. Schacht.* The oïdium first appeared in Madeira in 1852, soon after the flowering season in June, attacking both leaves and the young grapes, and destroying the first year nearly the total crop. In the following year it was scarcely less injurious in its effects, and, with the exception of the summer of 1856, no wine was produced on the island from 1852 to 1857. As late as 1850 the wine crop, according to the tax levied upon it, amounted to 12,964¼ pipes, though in the judgment of those best informed it was double this quantity, yet in 1856 only 200 pipes were raised. No kind of grape escaped in Madeira, even the American grape, *Vitis vulpina*, which before 1856 did not suffer, likewise became affected. From an oral statement of Mr. Acevede, major of the engineer corps at Funchal, the disease had shown signs of its presence long before this time in Madeira, since old leases from the west of the island Ponta do Sol contain this article of agreement: that if the grape should become diseased with a white bloom, the contract should be considered annulled. In Portugal, also, some evidence of the grape disease has been perceived, but to a less extent. The vine is raised in the southwest of Madeira upon espalier frames, formed with canes fastened horizontally, four or five feet above the ground, to wooden beams or wall posts. Under the shadow of this vine roof sweet potatoes and other useful vegetables are planted. Before 1852 the largest portion of the country around Funchal, as well as the western portion of the island, is said to have been covered with vine espaliers. In 1857 these were seen only here and there. Still later, the wine stock has been entirely neglected, and in its stead sugar-cane and cochineal have been planted. In the northern portions of the island, producing an inferior kind of wine, and where, consequently, less labor was bestowed upon its culture, the vine climbs upon trees, mainly chestnut. Vine espaliers were never seen here, and although the disease affected some isolated leaves, it never attacked the grape. The 200 pipes mentioned as the product of 1856 were derived exclusively from this portion. It will thus be seen that the consumption of Madeira wine has rapidly diminished, and that that which is now sold as such is not genuine.

In 1831, Great Britain imported 209,127 gallons or 3.57 per cent. of her total wine consumption from Madeira, while in 1861 it amounted to only 28,749 gallons or 0.27 per cent. Schacht calculated the annual loss of the island from the oïdium to be 1,137,990 dollars. The Madeira is replaced in part by the various wines of the South Canary islands, or the proper Canaries, viz: Teneriffe, Canary, Lanzerote, Fuerteventura, Palma, Gomera, and Ferro. These are situated nearer to the tropics and the African continent than the North Canary group, and all cultivate wine. In the middle ages Canary wine was already celebrated. We need only allude to the inn at Eastcheap, and Sir John Falstaff, to show that even at that time the wine of the Atlantic islands was known and prized. The total crop of the seven islands formerly amounted to over 25,000 pipes. The grape disease has diminished the wine product of the Canaries one-tenth. The same is the case with the Western or Azoric islands, which the writer of this article vis-

* Dr. Wm. Hamm's Weinbuch, Leipzig, 1865, p. 321.

l in 1849–'50. The soil, like that of the Canaries, is entirely volcanic, and prob- y but a few inches deep; to prevent it from being blown off by the wind, the ıeyards are divided by stone walls into small squares, and produce enormously, ottle of fine wine selling for about four cents. The island of Pico alone lded annually from 15,000 to 30,000 pipes of wine. Also the other islands, rceira, St. Miguel, Fayal, St. George. and Graciosa, produced splendid wines pally exported to North America and Brazil. Vigorous efforts have of e been made to again increase the wine culture in these western islands.

REMEDIES FOR THE GRAPE DISEASE.

In the face of the wholesale destruction of so important a plant as the vine, rous means were resorted to, purporting to be effectual in arresting the rav- es of the disease. Two of these were successfully employed. The use of the first, z., pulverized sulphur, is attributed to an English gardener at Leyton, named yle. M. Gontier, near Paris, has improved the efficacy of the remedy by in- nting a small hand-bellows, by means of which the powder is forcibly ejected. hen signs of the disease show themselves, sulphurization is resorted to at once. is a good plan to apply the sulphur when the leaves and fruit have previ- y been covered with dew, or sprinkled with water. The berries which are ly affected at this time remain stationary, while the remainder attain ma- y without any further trouble. Microscopical examinations have revealed ighly interesting fact, that in the vicinity of every sulphur granule the ular texture of the oïdium withers and dries up; further, that spores already are destroyed, and that others are no longer developed. In what way the acts it is difficult to explain, considering its insolubility in water. ether a gradual oxidation and formation of sulphurous or sulphuric acid en- , or whether simply a slight volatilization of sulphur (sulphur gas) takes ace, is not proved. The latter assumption gains ground from the fact that thouse gardeners observe highly favorable results from simply strewing sul- ur powder upon the heating pipes, having a temperature of 60° to 70° C.= 0° to 158° Fahrenheit. Furthermore, experience has shown that during hot eather, and under the influence of the sun's rays, a quicker destruction of the d akes place. There is no good reason why solid sulphur should not, water in the form of ice, volatilize in a small measure. However this may , a single sulphurization is rarely sufficient to arrest the disease. Some spores its action, and their rapid development must be prevented by a new ap- on within three to four weeks' time, until the growth of the grape is per- ted. This proceeding is practiced now, almost without exception, in the th of France and in Italy. The use of sulphur has become so great that the h government was induced to lessen the duty considerably on its impor- . Although sixteen pounds of sulphur may suffice for nearly two acres e-vines, yet its consumption in this way almost equals the quantity em- yed in the manufacture of sulphuric acid and of gunpowder. By the sys- c use of sulphur for years past, the oïdium has been almost entirely anni- d; and it is asserted, besides, that sulphurization promotes essentially the e in fruit, (as also in the case of fruit trees,) but in this respect the effect y be equalled by substitutes in powder form, as, for example, the dust from e roads. Experience long since taught that fruit trees and vineyards bear plentifully when situated on much-frequented and dusty roads.

TREATMENT OF THE VINES WITH HYDRO-SULPHIDE OF LIME.

Doctor Turrel, during the first days of the month of June, 1852, noticed e e of the oïdium Tuckeri on his own farm, comprising about thirty district of Toulon, France, and resorted at once to the use of hydro-

sulphide of lime. The first trial proved successful. The leaves turned green once more, and the berries resumed their former brightness. The sprinkling was then resumed; the weather at the time was calm, and the atmosphere warm and sultry. The method of proceeding was as follows: Two men carried, by means of two long poles, a wooden vessel containing about twenty-five quarts of hydro-sulphide of lime; the liquid was poured into buckets, and passing along each row of vines, the leaves and grapes were sprinkled by means of a broom dipped into the mixture. Those branches which were prostrated on the ground were raised and brushed over with the broom. Cypress brooms proved the best.

Recipe for preparing hydro-sulphide of lime.—Flowers of sulphur, 68 ounces; lime nearly slacked, same quantity; mix and knead together thoroughly; add three to four quarts water. Boil the whole in an iron kettle for about ten minutes; allow it to settle, and decant the liquor. Preserved in well-corked bottles it will keep several months. In using, one quart of this preparation is poured into one hundred quarts of clear water, stirring the mixture meanwhile. With one hundred quarts, one hundred and fifty yards of éspalier may be moistened. It will be found necessary to repeat the operation two or three times before the blooming of the vines, and a last time when the berries begin to form. There is good reason to believe that the compound formed in gas-works, by the purifying of the gas from sulphur, could be advantageously employed in the place of that mentioned above.

According to Dr. Engelmann,* a reliable botanist, there are two species of fungi destructive to our American vineyards, both of which he regards as different from the European parasite, *Oïdium Tuckeri*. The first species, *Botrytis viticula*, of Berkley, is very similar to, if not identical with, Oïdium Tuckeri. It makes its appearance in the latter part of June on the lower downy surface of the leaves. About the same time it appears on the pedicles, and afterwards on the young berries when they are about the size of peas, or smaller. Dr. Engelmann never saw it on full-grown berries. Those attacked on their surface, or on the pedicles, soon fall off; but the most material damage is done by this "mildew" infesting the leaves, whereupon the greater part of the berries gradually turn a yellowish brown color at their base, shrivel from that point, assume a club-shape, and at last dry up entirely, still remaining adherent to the withered racemes. This is the *brown rot*, so well known to cultivators of grapes. The second kind, the *black rot*, is brought on by a very different fungus, which Dr. Engelmann thinks is undescribed as yet, that is, that it is a new species. He says it belongs near Ehrenberg's genus, *næmaspora*, and ought to bear the name of ampelicida. It makes its appearance only on nearly full-grown berries, exhibiting in the first stage a discolored spot on the side, (but never at the base of the berry,) about two lines in diameter, with a dark spot in the centre. This spot soon becomes light brown, and remains so, while the surrounding part of the berry gets darker, and exhibits under the microscope a rough or pustulous surface. Gradually the berry shrivels up and becomes black. The individual fungi are little spherical bodies (from 0.07 to 0.10 of a line in diameter) formed beneath the surface in great numbers, which, developing, elevate and at last burst the epidermis. They then open at the apex by a small jagged hole, and, shrivelling with the berry, eject a more or less curled or twisted thread which, when moistened, becomes gelatinous, and shows the innumerable oval sporules, (from 0.004 to 0.005 of a line long,) each imbedded in mucilage.

Whether different species of grapes contain also different species of parasites, or whether the same fungi, under different circumstances, relating to food and meteorological alterations, assume a different form, the writer must leave undecided. It is true, that in the animal kingdom the different species foster different

* Transactions of the Academy of Science, at St. Louis, vol. II, 1863. Extract by Professor Silliman, in the Horticulturist, vol. XVIII, p. 304.

asites, so much so, that the examination of these animal parasites often aids the determination of the species.

To return to the grape disease. We guard against its attacks on this conti-it by precisely the same means as suggested for a cure in Europe—that is, by use of sulphur.

In Dingler's Polytechnic Journal, vol. CL, Ed. 1858, p. 146, is the following ract from M. Marès in regard to experiments upon the grape disease:

"The following advice in the treatment of diseased vines will prove of great antage:

"1. The diseased vine needs special care, the ground well cultivated, loose, and ous, no weeds. Everything that impedes the growth favors the development the disease, as bad pruning, insufficient hoeing, &c., &c.

"The appearance of the fungi destroys the growth. This must, through fos-ing care, be restored, and sulphur applied against the oïdium.

"2. It is better to apply sulphur too early than too late.

"3. Sulphurization of the plant at the flowering season proves the most ive. At this stage it seems to have a salutary effect upon the growth also. nought that I observed in 1854–'55 that vine stocks that had been sulphu- bore better than others not so treated.

"4. The sulphur must be applied carefully and thoroughly to all parts—the od, the leaves, flowers, and fruit, and must not be sparingly applied. The wder is blown upon the plant from two opposite directions while passing tirely around it. The application has been effective when the leaf or fruit ld towards the light appears covered with the sulphur-dust. We must not erlo the fact that sulphur destroys the oïdium *only* by being brought in with it.

"5. A vineyard that has been recently sulphurized must remain at least veral days before hoeing. The flour of sulphur falling to the ground in rt volatilizes by the hot rays of the sun and condenses on the shady parts of vine stock. In this way the sulphur may reach many points that have d the blowing process, and this advantage would be lost in burying the lphur by too soon hoeing.

"6. If the sulphur is dissolved or dissipated by the wind and rain on the same y it is applied, we may wait several days before a second sulphurization; for first supply, in spite of the rain, is effective, provided the temperature is ° to 20° R. = 68° to 77° Fahrenheit. If the vine stock is well supplied with ves, as in July, a strong heavy rain does not prevent the effect of the sulphur, it adheres so firmly to the surfaces diseased with the oïdium that water can y carry it off together with the fungi or mildew. In this respect a rain does harm after the 1st of July.

"7. The requisite sulphurization should not be postponed on account of the but more sulphur should be applied than in calmer weather. I have sul-ed vine stocks that were but little developed in the month of June, and y did well.

"8. The effect of the sulphur may be judged of in the course of ten days after operation, (for we must allow time for the growth to assume a normal con-ion and develop itself.)

"9. Sulphur is no absolute protection against the disease, for it does not pre-it its formation, and the process has to be repeated at regular intervals. It s more as a remedial agent than as a preventive, and we must, therefore, wait the first signs of the disease before we resort to sulphur, so as not to apply remedy uselessly.

"10. After the tenth of August, in the climate of Montpelier, France, the effect ur upon the blue grape that has been seriously affected with the disease longer perceptible. If the disease is absent until the formation of the re is less liability to its occurrence; but if it happens to attack the and fruit at this stage, the remedy is less effective.

"From the preceding instructions it will be seen that the timely application of sulphur before and after July 15 (taking this date as the mean) will protect the vine from the oïdium until the ripening season. Experience has annually established this fact since the appearance of the grape disease.

"In the department of Herault, France, the formation and development of the fruit takes place from the fifth to the twenty-fifth of August. Any time of the day will answer to apply the sulphur, in case it does not rain, but it produces the same effect upon either a dry or moist surface; and if the temperature is not below 20° R. = 77° Fahrenheit, it will destroy the oïdium when brought in contact with it. The most favorable circumstances for applying the sulphur, to act quickly and effectively, are a warm sunny day and a gentle breeze, aiding the distribution of the sulphur, and enabling the surfaces to receive it. It adheres firmly where the oïdium develops itself, for the latter presents a velvet-like surface that receives and tenaciously holds the flour thrown upon it.

"My annual use of sulphur per hectare, (2½ English acres,) was in the month of May, 15 kilograms, (= 30 pounds;) June, 50 kilograms, (= 100 pounds;) July, 70 kilograms, (= 140 pounds;) costing me, together with the labor, (performed by women,) 50 francs and 45 centimes, (= to less than ten dollars.)

"If the sulphur used is fine, (like flour of sulphur,) it spreads better and less is required."

EXPLANATION OF THE PLATES AND FIGURES.

PLATE I.

Figure 1.—*a a*, webby, sterile filaments, or mycelium; *b b*, fertile, erect, and articulated filaments; *c c*, spores, or seeds, in a condition of vigorous vegetation.

Figure 2.—Three spores having reached their maturity simultaneously.

Figure 3.—*a a*, mycelium at different stages; *b b*, erect branches.

Figure 4.—*a a*, sterile filaments of mycelium at the left hand; *c c*, spores adherent and detached, according to Dr. Montagnie.

PLATE II.

Figure 1.—Small grape of retarded growth and infested by the oïdium.

Figure 2.—Fragments of this grape as it looked when inspected, October 16, 1852; *a a*, mycelium; *b b*, erect filaments; *c c*, spores. The oïdium appears weakened; the filaments are drooping. Temperature rather cool.

Figure 3.—*d d*, fragments of dried up filaments.

PLATE III.

Figure 1.—*a a*, fragments of the pellicle of an infected berry, but free or disentangled from the oïdium. The thin slice of the berry exhibits the elevated points described in the text; *b b*, cells of the pulp below the pellicle.

Figure 2.—*d d d*, fragments of the dried up mycelium. When placed in a moist atmosphere, below 59° Fahrenheit, they throw out radiating filaments, *a a a*.

PLATE IV.

Figure 1.—Herbaceous fragment covered at *a a* with black spots.

Figure 2.—Woody fragment in August, showing reddish spots, having remained stationary since the invasion of the oïdium.

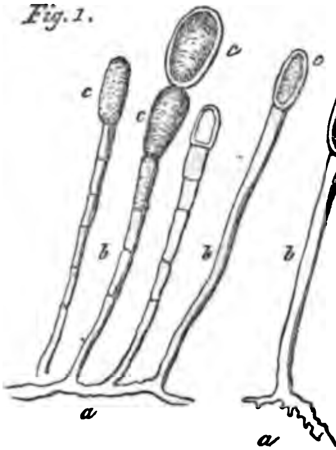
Figure 3.—Fragment of a growing berry, appearing punctured when freed from the mycelium.

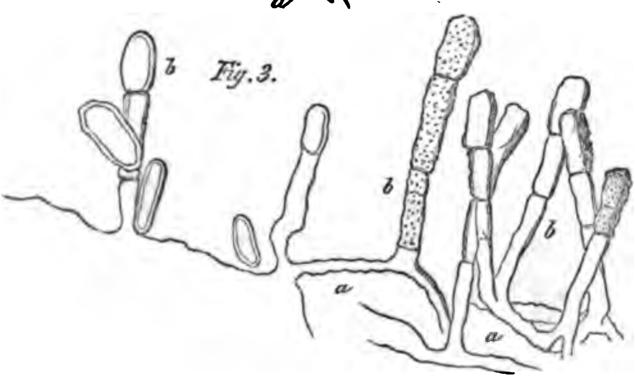
Figure 4.—Small portion of a bunch of grapes partially infected at the beginning of the disease—the first of July.

Figure 5. Two berries, the pellicle of which bursted longitudinally; a third exhibits the radiating points; the mycelium has disappeared.

The observations and drawings of Plates 2, 3, and 4 were made by Guérin Snéville. The first three plates represent the objects magnified 400 diameters.

PLATE 1.





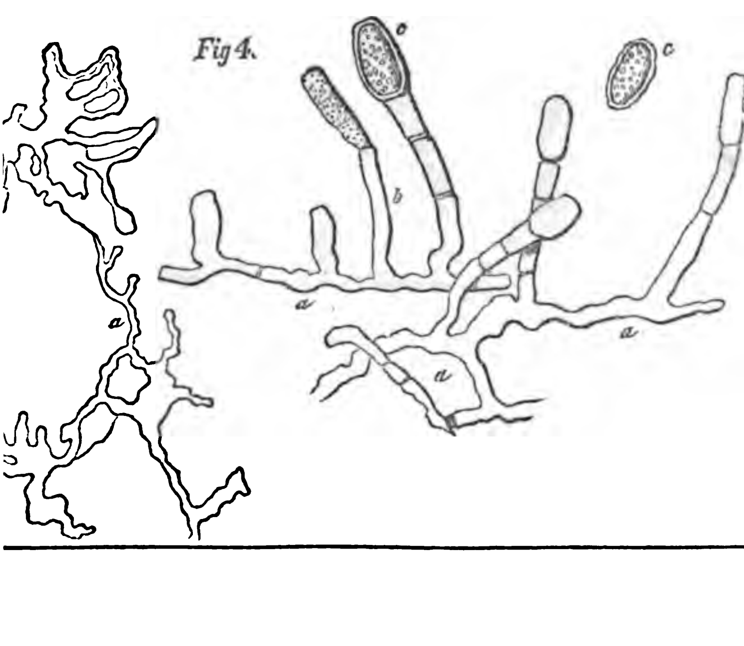
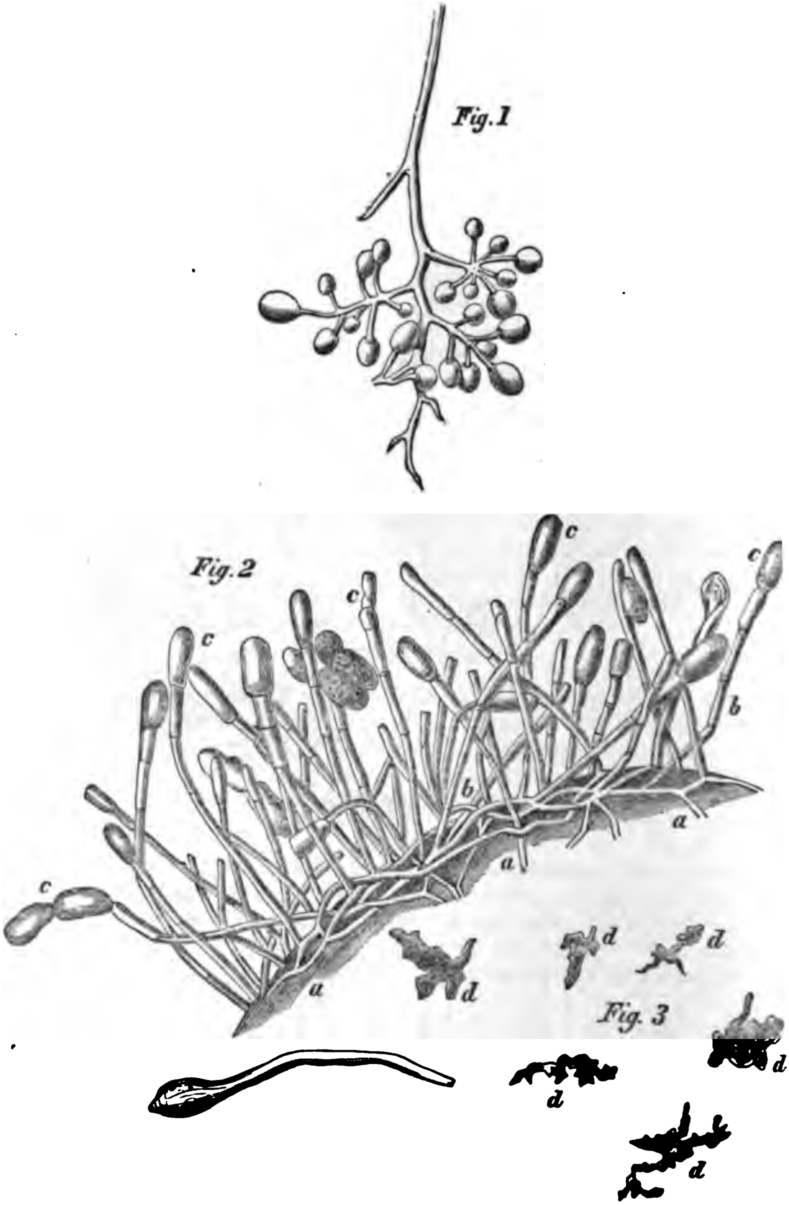


PLATE II.



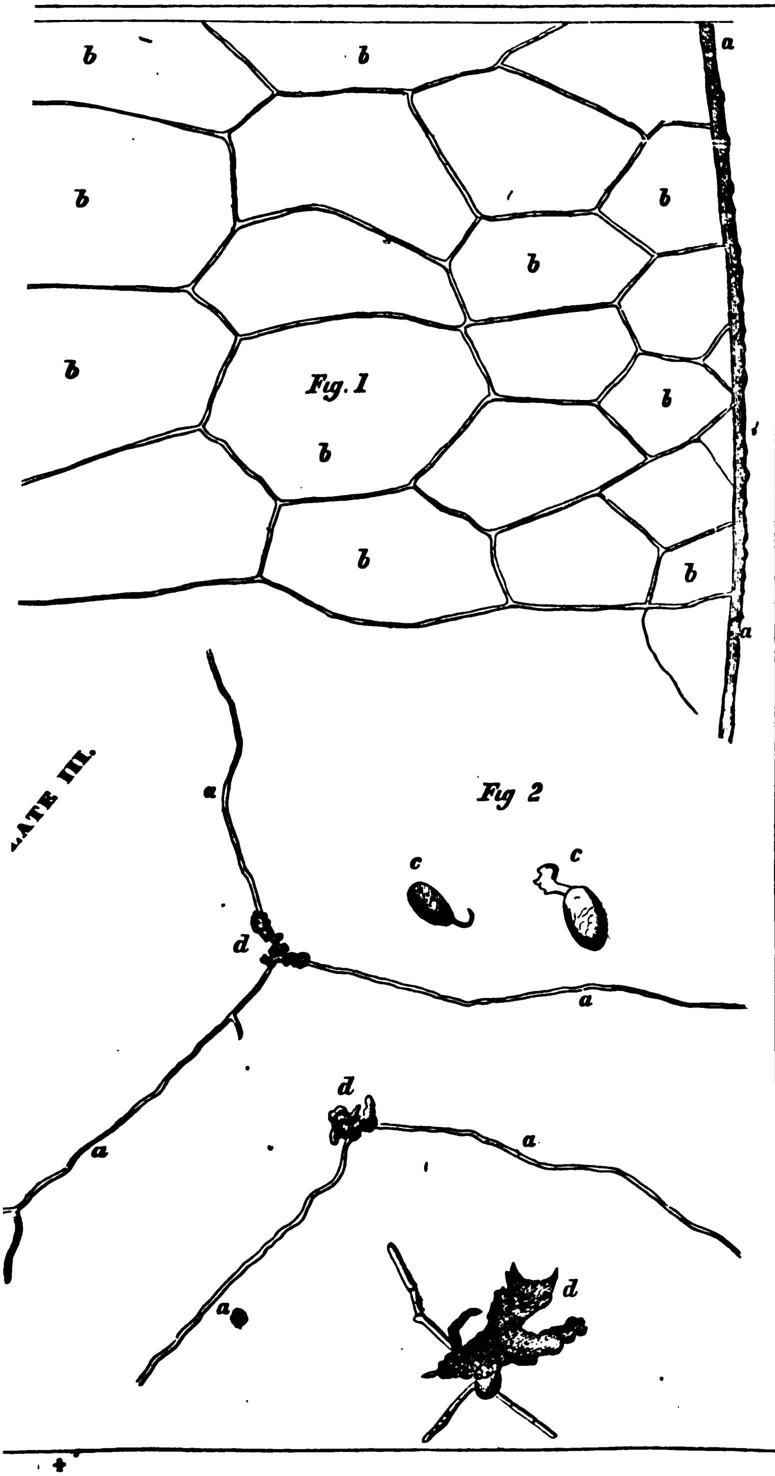

a
b
b
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Fig. 1
b
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a
LATE III.
Fig 2
a
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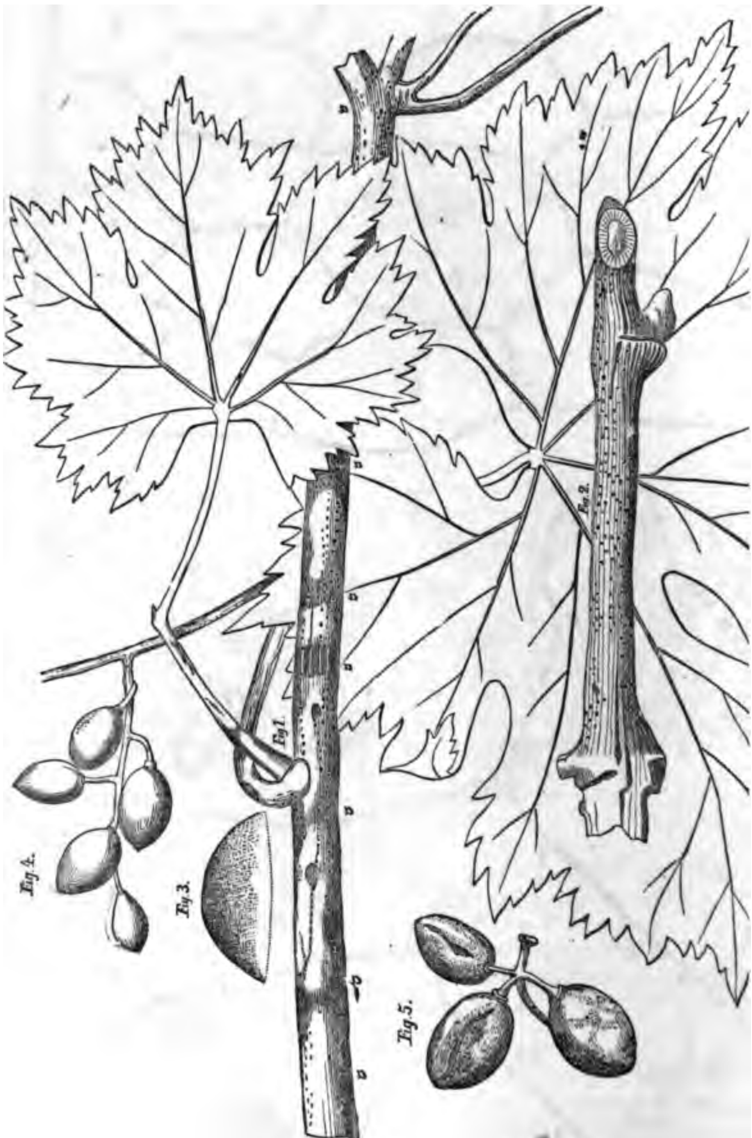
PLATE IV.



MADDER.

BY J. R. DODGE, DEPARTMENT OF AGRICULTURE.

NQUIRY has been made in different sections of the country for practical ormation concerning madder, its qualities, habits of growth, culture, and pre- ation for market. Petitions to Congress have been submitted upon the same ct, and congressional inquiry has been directed to it. While it is not med a very promising crop for American farmers generally, at present prices labor, it is thought worthy of a brief treatise, for it is quite possible, in al or southern States, near towns having available supplies of labor the precise time required, that the crop may be cultivated to advantage, ially with the use of improved economic modes of culture and labor-saving chines.

PROPERTIES AND USES.

dder (*Rubia tinctoria*) has long been cultivated for the dye extracted from roots. The Greeks and Romans used it two thousand years ago. It was led *rubia* by the Romans, and by several different names by the Greeks, one which, *varantia*, has given the French word *garance*, by which the plant is tinguished in France. One of its extracts, peculiar to that country, is largely orted into this country, and called garancine.

e is a difference in the intensity of the coloring principle in madders from nt localities; and, as generally stated, there are two distinct principles— *zarine*, red, and *xanthine*, a yellow color. Some have recognized still another, *purine*, insoluble in water, obtained by treating the powdered root, when ex- d of its alizarine, for some hours in a hot solution of alum, with a little nuric or hydrochloric acid, by which a precipitate is obtained soluble in hol, and yielding purpurine by distillation. The primary coloring principle, *zarine*, is obtained by mixing madder in fine powder with an equal weight of uric acid, and allowing it to remain a few days until all the vegetable elements alizarine are carbonized, when the acid is washed out with water, the residue d with cold alcohol to dissolve fatty matters, then dissolved in boiling nol, from which the coloring matter is obtained by distillation. It is without , insipid to the taste, neutral to test papers, slightly soluble in cold water, soluble in ether or alcohol in all proportions. The aqueous solution is of a e rose-red color; the etherial, a golden yellow. Sulphuric acid gives a solu- of a blood-red color. Xanthine, the yellow coloring matter, is soluble in and alcohol, and sulphuric acid produces a green. It is probable, after all, these products are all modifications of one coloring principle. It is used for ng cotton goods mainly. It does not answer well for silks, not affording a r of su brilliancy. It is very useful and convenient in calico printing, nt or different tints obtained by the use of different mordants, in- r rple, yellow, orange yellow, and brown.

nas sl wn, by analyses made by Mr. Carnes, in Lowell, Massachu- s, of the French madder of Avignon contained 32 per cent. of te or , while Turkey madder yielded but 18, and a Massachusetts . To this fact he attributed the superiority of the Avignon that a portion of the mineral had been mixed with the root

in grinding, and holding that a similar admixture would make ours the best madder in the world, from the fact that the introduction of five per cent. of chalk into the home product had produced a result equalling the best French madder dyeing.

IMPORTS.

Twenty years ago the imports of madder were so considerable as to induce experiments in its culture and preparation. From a statement made in 1848 there was imported into New York in eighteen months from January 1, 1845, and into Boston, Philadelphia, and Baltimore, in twenty-one months from the same date, an aggregate of 16,804,715 pounds, costing $1,620,415, or about ten cents per pound.

In the statistics of the commerce and navigation division of the treasury, from which the following table is compiled, the quantity given for the first three years (though the class is not specified) is presumed to be "ground or prepared."

Statement of imports of madder into the United States from 1855 to 1864, inclusive.

Years.	Root.		Ground or prepared.		Extract.		Total.
	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Dollars.
1855	....	....	10,652,548	851,979	....	....	851,979
1856	....	....	20,847,472	1,671,805	....	....	1,671,805
1857	....	....	14,113,425	1,375,472	....	....	1,375,472
1858	....	78,144	643,642	....	....	40,567	762,353
1859	....	44,138	....	2,156,403	....	152,808	2,353,349
1860	....	35,911	....	784,671	....	585,698	1,370,280
1861	9,911	806	1,543,741	174,645	392,256	96,926	*280,250
1862	248,533	17,955	6,283,822	615,713	590,992	118,451	752,119
1863	....	....	5,752,822	525,419	1,236,317	†249,867	777,802
1864	531,370	46,313	7,491,931	542,174	....	242,385	830,872
Total	....	....	....	....	....	....	11,026,311

* Including India madder. † Including extract of logwood also.

The largest portion of this importation comes from France. Holland, Belgium, and Turkey furnish much of the remainder. These prices are those of the countries from which the import comes, and represent gold values. The present quotations in New York are: Dutch, $7\frac{1}{4}$ to $8\frac{1}{2}$ cents; French, $7\frac{1}{2}$ to $8\frac{1}{2}$ cents, in gold.

It is stated that the demand for madder is less than formerly, in proportion to the amount of manufacturing done, in consequence of the substitution of analine dyes extracted from coal-oil or petroleum; and the price has been somewhat reduced at the same time. Twenty years ago the price was about ten cents per pound. In 1864 the root was bought abroad, in gold, for eight cents seven mills, and the prepared for seven cents two mills per pound. In currency, however, in our ports it must have commanded at that time little short of twenty cents. The same fact must be taken into consideration, to some extent, in estimates of probable prices and profits in the future.

In 1865 the imports were nearly all from France, in the form of extract and garancine. Our French correspondent gives the process of making garancine at Avignon. It is first washed to separate the yellow coloring or xanthine. It is then boiled with fifty per centum of sulphuric acid at 66°, to render the fibre

soluble. Again the acid is washed out, and it is pressed, dried, and ground. The water of the first washing, by fermentation and distillation, produces a very strong alcohol used in the arts.

CLIMATE AND SOIL.

A mild climate is essential to the best growth and highest development of its peculiar properties; yet it is cultivated throughout a wide range of climate—on the East India coasts, the shores of the Mediterranean, and upon the northern German coasts. All of our middle, southern, and western States afford a climate suitable for the culture.

A rich and deep dry soil is required, with a good proportion of humus; and if a decayed grass-sward is selected, it is all the better. If rich and deep, so that the roots may readily develop and spread, a soil inclining to sand may be better than stiffer soils. In France it is grown in all kinds of land, but in soils too dry or sandy it is said that "the root remains small, produces little, and after trituration has a very light color."

The roots, which are long and crawling, ligneous, and divided into branches, are yellowish in color and of an astringent taste. In light soils they are small and of a red orange color when dried in the air. In soft, light, rich lands they are grayish in color, but dusky red when powdered. In France the root is extensively cultivated, especially in the department of Vaucluse, where an extensive area, formerly swamps, and lightly esteemed by the proprietors, has been drained, and now commands a high price, and produces an excellent quality of madder. These lands contain a very large proportion of chalk. Undrained or badly drained soils are entirely unsuitable to its growth; and, therefore, heavy uplands, tenacious with a stiff clay, are found to be unprofitable for such a crop. River bottoms, not clayey, and especially "second bottoms," which contain a rich, light loam abounding in humus, are employed to advantage.

CULTURE IN ZEALAND.

In Zealand it is grown upon alluvial bottoms deposited by the sea, which are highly alkaline and silicious, and produce a root of yellowish color. It is propagated there by shoots or sets planted in May, in rows two feet apart. Clean culture by weeding and covering in autumn is pursued, and the roots are taken up and dried by means of stoves, and are a second time dried before being ground.

The yield in Zealand averages 2,350 pounds of powdered madder. The winter being severe, the roots are oftentimes taken up at eighteen months' old. The product is less in such case, but the risk and trouble of a second wintering is avoided.

CULTURE IN FRANCE.

In the French department of Vaucluse it is grown from seed in a chalky alluvial deposit, and is sown in beds five or six feet wide, with a space of eighteen inches between the beds. In November of the first year, the young plants are covered two or three inches with earth taken from between the beds. In the second and third years the beds are carefully weeded, and the foliage cut for forage when in flower. The roots are dug in August or September of the third year, and simply cleaned if the earth is dry, but washed if so damp as to adhere. In digging, the earth is loosened by a spade or fork, and the roots are drawn, piled, dried in the open air, and packed in bales.

The Department of Agriculture has received, through the courtesy of the Secretary of State, several communications relative to the French mode of culture,

forwarded by Consul Geo. W. Van Horne, from Marseilles, prepared by practical operators of that vicinity.

From one of these communications—that of Mons. A. de Speyr, of Avignon—the following extracts are made, detailing the experience of many years in the cultivation of madder in the department of Vaucluse:

"Composition of the best soils:

Sand	40.8
Lime	2.3
Clay	53.5
Humus	3.4
	100

"Of an inferior quality:

Sand	22
Lime	3.5
Clay	73
Humus	1.5
	100

"*Seed.*—The seed should be perfectly dry and free from fermentation. The seed of the paluds is much better than that of the roses. One may preserve it in a good state for two years by keeping it in a dry place and subjecting it to a thorough ventilation.

"*Sowing.*—A ridge of eight or nine inches wide and one and a half inch deep is made with a spade and sowed. At a distance of two inches another ridge, of the same size, is run, having care to cover the seed of the first ridge with the earth taken from the second, and so on to the completion of the third ridge. These three ridges form a platband about three feet wide, separated from each other by a space one and a half feet in width, left as a path for the laborer in weeding. From this path also is taken the earth to cover the plants in autumn, when the leaves are dead. For the sake of economy these paths are sometimes planted with potatoes, beets, &c., but each extra plant should be put far apart.

"If the earth is well pulverized, instead of the seed being sown, one had better plant roots of the preceding year's growth, as crops obtained from the plants display much finer roots than when raised directly from the seed. But if the ground is not friable, but hard and clayey, the plants would not grow well, and possibly would not take at all. In this case seed must be sown. An acre of madder produces seed sufficient for three or four acres of sowing.

"*Transplanting.*—For the transplanting of roots, as indicated above, ridges, about three feet wide and three inches deep, are made, and the roots laid therein just free from each other; and between these ridges an uncultivated space is left, as in sowing.

"*Weeding.*—The seed is sown, or the roots transplanted, in March, and great care must be observed in keeping the land free from weeds; the paths, also, being attended to in this respect.

"*Irrigation.*—When the land is dry, from drought, it will be necessary to water it by irrigating the intermediate paths, if possible. Slimy water is preferable to clear water for this purpose.

"*Covering.*—In autumn, when the plants lose their verdure and turn to a grayish tint, they must be covered with one and a half or two inches of earth taken from the paths. In the following spring the clods must be broken with a rake.

'.—The madder cultivated in strong, dry soils may be removed in
s, and from wet lands in eighteen months. Thus the madder of the
n requires three years to mature well, while the paluds may be dug in
e and a half to three years. The roots should not be extracted until
has been produced. Some cultivators, who are pressed for the moneyed
of their labors, do not wait for the seed; but the madder thus prematurely
l is of an inferior quality.

ramifications of the stalk are first cut, dried, and threshed for the seed;
w, or refuse, is saved as fodder for cattle. The roots are then dug with
le or fork, and as their length will average one and a half feet, it can be
it their removal leaves the land in a prepared state for some other crop.

ing.—When dug they are spread on the aire, (usually a level spot of
paved with brick,) where they are dried by the action of the sun and
hen the larger roots may be easily broken, they should be heaped up,
he smaller tips *(pettis couts)* may become thoroughly dry. Care must
that this place be free from dampness.

turation.—When the roots are sufficiently dry they are embaled and
he manufacturers, where they are stored in a well-ventilated granary.
en from the granary in proportion to each day's demand, and, having
t to lose 15 to 16 per cent. of water in a drying oven, it is passed under
nill-stone and ground to powder. The bolters keep the coarser portion
ond grinding."

ollowing are extracts from the statement (recently received) of Messrs.
rothers and Leenhardt, relative to the expenses of cultivation in the dis-
ut Marseilles:

Expenses per hectare (two and a half acres) by manual labor.

FIRST YEAR.

	Soft soil, (paluds.)	Compact soil.
rinter for breaking or ploughing..	44 at frs. 2 = 88.00	90 at frs. 2 = 180.00
(dung,) wagons of	22 at frs. 20 = 440.00	22 at frs. 20 = 440.00
....	22 at frs. 6 = 132.00	22 at frs. 6 = 132.00
....	85 at frs. 4 = 34.00	34.00
lays' work of men and women...	8 at frs. 3 = 24.00	24.00
days' work of women..........	66 at frs. 1 = 66.00	66.00
in summer three times	34.00	34.00
in winter, fixed price............	24.75	24.75
and	165.00	132.00
	1,031.75	1,090.75
t 10 per cent	103.17	109.00
	1,134.92	1,199.75

SECOND YEAR.

....	Frs. 22.00	Frs. 22.00
one in summer	12.00	12.00
for winter	24.75	24.75
nd	165.00	132.00
	223.75	190.75
....	22.37	19.07
st year	101.62	104.75
	347.74	314.57

THIRD YEAR.

Harvest, days' work	165 at frs. 5 = 645.00	244 at frs. 3 = 732.00
Drying and packing, quintals, 110 lbs	77 at frs. 1.58 = 121.66	55 at frs. = 86.90
Rent of land	165.00	132.00
	781.66	950.90
Int. of capital of first year for six months	51.58	54.50
Interest of capital of second year	11.18	9.53
	844.42	1,014.93

RECAPITULATION.

	Soft soil, (paluds.)		Compact soil.	
	Francs.	*Dollars.*	*Francs.*	*Dollars.*
First year	1,134.92	217 90	1,199.75	230 35
Second year	347.74	66 75	314.57	60 39
Third year	844.42	162 12	1,014.93	194 08
	2,327.08	446 78	2,529.25	485 62
Cost per quintal, (110 lbs)	30.32	5 82	45.99	8 83

"It is found, in taking a piece of ground of great firmness and of a productiveness of 33 quintaux of root per hectare, that the expense will amount to only 26.40 francs per quintal, (110 pounds;) whilst in lands of less tenacity there will be a yield, say, of 55 quintaux, which would reduce the cost of the first crop to 15 francs the quintal."

ITS CULTURE IN THIS COUNTRY.

The plant is found to be very hardy in this country, is entirely exempt from injury by insects, and not liable to suffer from drought in deep soils after the first season. Twenty years ago it was produced to some extent in some portions of the country, especially in Ohio. Some of the most successful cultivators reported a product of 2,000 pounds per acre. A Mr. Joseph Swift, of Birmingham, Erie county, Ohio, for several years engaged in its production, with profitable results for a time at least The following is a statement of one of his crops, as reported originally by Mr. M. B. Bateham:

By 2,000 pounds of madder, at 15 cents per pound		$300 00
Contra.—To 100 days' work, at 75 cents	$75 00	
To use of land four years, at $4 per acre	16 00	
To grinding, packing, &c	9 00	
		100 00
Leaving a profit of		200 00

Its cultivators have sometimes met with loss from drought soon after planting. The great length of time required for maturing the crop has been a great drawback to its cultivation, especially if coupled with ill success through drought in starting a plantation.

The soil in which the Ohio experiments were made was in most cases river bottom, not wet or liable to overflow. Good strong upland, not clayey enough

ake hard, was thought to be almost as good, and a soil impregnated with e was found to produce the best quality.

The land was ridged up in the autumn, and in the spring received a dressing arn-yard manure, sometimes with leaf mould or decomposed muck in the case iplands, previous to ploughing and harrowing. For planting, light, straight rows were made, eight feet apart, and the roots were laid lengthwise one foot and covered to the depth of two inches. Ten bushels of sets were suffi-it for one acre.

A cultivator was employed between the rows, with hoes along the rows as n as the plants made their appearance, and such cultivation was continued such intervals as to keep the surface free from weeds. The more thorough this respect, the less labor was needed the next season.

Vacancies were filled up by lifting and dividing some of the stronger roots, en the plants were well rooted, in May or June. When twelve or fifteen hes high, the tops were bent down on each side and covered with earth, cepting the tip.* This operation was continued whenever the new shoots had ained the same height as before, until the entire space between the rows was , with the exception of a space of two feet in the middle, which was kept and mellow by a single plough. This process of layering filled the whole with roots, and left no necessity for culture the second year, with the on of weeding and ploughing the middles. But the tops were bent down covered to fill closely the remaining space, until it became difficult to get m the ditches with which to cover. Care was exercised to keep the edges the bed as high as the centre, to prevent the too rapid drainage of water and e danger from drought.

Washing and drying.—The roots were washed in some running stream. If was near, they were washed in large sieves, the wire as fine as that of wheat half a bushel at a time, the roots being carefully pulled apart while wash- Two hands could thus wash 125 to 150 bushels per day. They were then on platforms made of tight boards, making a layer of roots four inches in upon each, and dried in the sun, the platforms being set up so as to incline wards the south. Five or six days of dry weather, with protection from dews night, was found sufficient to cure it. Subsequently it was kiln-dried and ound.

Kiln-drying.—The following plan was recommended and adopted in these experiments, by which the drying was accomplished in ten or twelve hours: lace four strong posts in the ground, twelve feet apart one way and eighteen er; the front two fourteen feet high and the other eighteen; put girths s the bottom, middle, and top, and nail boards perpendicularly on the out- , as for a common barn. The boards must be well seasoned, and all cracks noles should be plastered or otherwise stopped up. Make a shed roof of com-n boards; in the inside put upright standards about five feet apart, with cross- s to support the scaffolding; the first cross-pieces to be four feet from the or, the next two feet higher, and so on to the top. On these cross-pieces lay ll poles about six feet long and two inches thick, four or five inches apart. n these scaffolds the madder is to be spread eight or nine inches thick. A floor laid at the bottom to keep all dry and clean. When the kiln is filled, take t or eight small kettles or hand-furnaces and place them four or five inches art on the floor, (first securing it from fire with bricks or stones,) and make es in them with charcoal, being careful not to make any of the fires so large to scorch the madder over them. A person must be in constant attendance watch and replenish the fires; (but he should be cautioned not to remain long side, as the gas from charcoal fires is liable to cause suffocation.)"

Breaking and grinding.—The roots, which are brittle when dry, were broken threshing with flails, or passing through a bark mill or other crusher. They

were ground immediately after kiln-drying; otherwise they would gather dampness. After crushing, the grinding was done in a common grist-mill. It was then packed in vessels, like flour, and was ready for market.

So far as I have been able to ascertain, the culture of madder is not carried on to any extent in this country at the present time. We have a suitable climate and productive soils. The greatest obstacle to success with it seems to be the high price of agricultural labor and the scarcity of casual or irregular labor, which renders it difficult to obtain help at the precise season when required. Another reason is found in the proverbial disinclination of our people to agricultural or any other species of productive industry which requires three years to secure returns. It seems to be a remunerative crop, if it can be produced under favorable circumstances. By the selection of a proper soil and a very favorable climate, (perhaps in the southern States or in California, where its constant growth might produce an excessive yield with labor of German women or children, or Chinamen,) with system and labor-saving appliances in cultivating and preparing it, a profitable result might be secured. It is very proper and highly desirable that a fair and persistent trial should be made to overcome the difficulties which have interfered with the enterprise thus far.

If there are those who would make another effort at the present time, let them choose a southern or southwestern aspect, and select a deep, rich, sandy, and calcareous loam, free from all weeds. Let it be ploughed early in the autumn and again turned up into ridges before the winter frosts set in, so that the soil may be finely pulverized in spring, when the beds are prepared and the sets planted. The ground should be dry before planting.

As a preparation for planting, the soil should be thoroughly and deeply pulverized, and well-rotted manure well incorporated with it. The sets, taken from plantations two or three years old, should have roots four or five inches long. The roots should be dipped in a thin paste of fine rich earth and water, and set with a dibble, leaving the crown above the surface and the earth properly compacted about the roots. During the summer months clean culture is required, with hoe or cultivator, or, while the plants are young, with a light plough; and in the autumn, after the tops decay, the plants should be earthed up for the winter, as a protection against frost.

The following extract from a note received from Mr. M. B. Bateham, of Columbus, Ohio, fomerly edirtor of the Ohio Cultivator, corroborates the views herein expressed:

"I believe the business has been entirely discontinued in Ohio, and I have no knowledge of its being practiced in any other State. The reasons for this are not from any lack of adaptedness of soil or climate, but simply because the business requires *much labor*, which must be done by hand, and can only be carried on to advantage near large towns, where Germans or other cheap laborers can be readily obtained at special times when wanted. This was the cause of the abandonment of the business by Mr. Swift and others who have tried it in Ohio. My own experiment, near Columbus, was on soil found unsuited to the purpose. It was too rich and clayey, (alluvial river bottom.) Good sandy alluvium is found well adapted to this crop. For the past few years the price of labor has been too high to encourage any one to engage in madder growing."

CHINA GRASS.

BY J. R. DODGE, DEPARTMENT OF AGRICULTURE.

China grass of the East is attaining importance in the commercial and cturing circles of Europe. Specimens of the plant in the garden of the nent, and of its fibre in the museum, have attracted much attention, and a brief mention in this report.

a member of the nettle tribe, the *Bœhmeria nivea*, formerly known as *nivea*. It is called "*tchou-ma*" in China. A variety in Sumatra, the *ria tenacissima*, (of Roxburgh,) is known as rami, kalmoi, or calloee The *rhea*, of Assam, is the same plant. It is understood that these two s (*B. nivea* and *B. tenacissima*) are distinct, though their fibre is very , and for all practical purposes identical.

r ttles produce a good fibre. The *Bœhmeria puya*, of India, yields a ing a commercial value nearly equal to the *B. nivea*. *Urtica hetero-*, or the Nilgiri nettle, which abounds among the Nilgiri hills and other f India, produces what is known as "vegetable wool," which commands r $400, per ton in England.

ecimen of very strong fibre, from a variety of nettle found in Minnesota, en received at the department, but the accompanying fragments of the were in a condition too imperfect to identify its botanical classification. sent by S. W. Pond, of Shakopee, Minnesota, who represented it as a atively abundant wild product of that vicinity.

s a plant very susceptible of cultivation and propagation, in various increasing readily by seed and suckers. Its growth is rapid and nt, vieing in vigor with the rankest tropical weeds. It thrives in a moist , but is not very particular as to soils. P. L. Simmonds, editor of the logist, says of it: "So rapid is the growth of this plant, that, by careful tion, the colonial botanist of Jamaica found one of its shoots attain the of six and a half feet in fourteen days, and ultimately eight and a half ut in good land it would exceed this by two feet, while in China and st Indies, where it is highly cultivated, eight feet is the height mentioned makes, from which fibre six feet long is obtained."

meria tenacissima was brought into Calcutta from Bencoolen, in 1803, Roxburgh, and cultivated in the botanic garden, under his direction, for years. Its cultivation was so extended that, in 1814, specimens of its ent to England, were experimented upon, with so favorable a result, as to h and other valuable qualities, that the Society for the Encouragement s and Manufactures awarded a silver medal to Captain Joseph Cotton, of st India Company, for its introduction. A practical difficulty arose to t its immediate use for textile purposes. The processes employed in the tion of flax and hemp and other common fibres were found entirely in-ble to the reduction of nettle fibre. Of course the primitive and waste-de practiced by the natives—scraping by hand—was not to be consid- The practice of the Todawars, who previously boil the stems in water, e Malays, who steep the stems in water for ten or twelve days, was suf-y effective for the requirements of Asiatic manufacture, but useless in the ctories of civilized nations. Maceration was tried, but it was ascertained

that the fibre itself was destroyed more easily than the glutinous matter that cemented it together. Several machines, intended to break the unretted stems, were originated, tested, and abandoned during the forty years that followed its introduction. A patent was obtained, in 1849, by L. W. Wright & Co., for a process for preparing this fibre, which removed, to a great extent, the practical difficulties preventing its use. It consists of an ingenious arrangement for boiling the stems in an alkaline solution, after steeping twenty-four hours in cold water, and twenty-four hours longer in water of a temperature of 90°. The fibre is then thoroughly washed in pure water, and then subjected to the action of a current of high pressure steam till nearly dry.

Considerable quantities of "China grass" are now imported into England, and a new impetus has been given to trade by recent successes in attempts to perfect the processes of its manufacture. Beautiful specimens of China grass goods were exhibited at the international exhibitions of 1851 and 1862. Samples of the various beautiful products of this fibre have recently been received from the most successful of its manufacturers, Messrs. Joseph Wade & Sons, Bradford, England, and may be examined at the museum of the department. The following correspondence of the State Department, promptly forwarded to this office by Mr. Seward, illustrates clearly the present condition of this interesting manufacture:

UNITED STATES CONSULATE, SHEFFIELD AND BRADFORD,
At Bradford, December 16, 1865.

SIR: I have the honor to transmit herewith a report from Mr. McClintock, vice-consul at Bradford, embodying some interesting facts in relation to the manufacture at this place of the "China grass," so called, by Messrs. Joseph Wade & Sons.

The Messrs. Wade have been experimenting with this vegetable production during the last seven years, and have now brought its manufacture to a considerable degree of perfection. Many other persons have attempted the same thing, but have all, with perhaps one exception, been unsuccessful.

The grass is said to be produced in considerable quantities in China, but the continuance of the civil war in that country has interfered with its production, and it now sells in London at the rate of eighty pounds per ton.

It is believed that many parts of the United States are favorable for its growth, especially the cotton-growing States, and perhaps Kentucky, Maryland, Missouri, and other States lying in nearly the same latitude.

I presume that the consul general at Shanghai will, if application be made to him, be able to communicate full information in regard to its culture, and thus be instrumental in introducing into the United States a very valuable production.

I will forward to the department the small case of samples referred to in Mr. McClintock's report.

I have the honor to remain, sir, your obedient servant,

GEORGE J. ABBOT,
United States Consul.

Hon. F. W. SEWARD,
Assistant Secretary of State.

CONSULATE OF THE UNITED STATES,
Bradford, December 15, 1865.

SIR: Upon your last visit to Bradford you expressed a wish for further information concerning the successful manufacture of the so-called "China grass" at this place. In accordance with this desire, and concurring with you in the belief

t there is at present a most auspicious opening for the introduction into the ited States of that valuable production, with a view to its culture upon a very scale, I beg, through you, to call the attention of our government and ple to some of the facts and arguments which seem to render its early intro- :tion so desirable.

Che Chinese have for centuries made, by hand-labor, various descriptions of rass cloth," well known in America and Europe, and often of great strength l beauty, from the fibre of *Bœhmeria cordata*, or *Urtica nivea*, known to nmerce as China grass. Large quantities of the grass have, at various times, n brought over to England, and probably also to the United States, in the e of finding a market among the dry goods manufacturers, who are always the lookout for new materials; but it has hit' erto been, and is even now, impossible to produce a true "grass cloth" by machinery. The fibre is brittle, though very strong, and it is found that the China grass cloth of ce is only to be woven by hand-labor, in which, of course, the Chinese ives are beyond the reach of competition.

;e quantities of the grass have therefore been in store in London and else- e for years. Some enterprising manufacturer would occasionally purchase ew tons with which to make experiments, but the only result, for a long time, that he who experimented the most lost the most. Thousands and even of thousands of pounds were sunk by one and another, who each fancied for that he had discovered the true method for working up this intractable :e. Whether it was tried in the United States or not, I do not know; t the concurrent testimony of my American friends in the trade is that no one now successfully working it at home.

Within two or three years past, however, several firms in this neighborhood, cially Messrs. Wade & Sons, of Bradford, and a company at Wakefield, re succeeded, by chemical means, in bringing the fibre into a state most sely resembling the best mohair, or other bright worsted, and have worked great quantities of the refined material, as a substitute for worsted, in many ds of stuff goods; always, however, in combination with cotton, (the warp ng cotton and the weft of the China grass,) as they have not yet been able work it properly alone.

Che manufacture of worsted goods (that is, of goods made of long-staple wool, distinguished from short-staple or ordinary wool) has become an immense de, of which Bradford has, at present, almost a monopoly, although the man- cture has lately been extending in many parts of New England. Four-fifths these goods are of mixed material—that is, are made with cotton warps. d for many articles of the kind, especially for those requiring a stiff, strong, l cool texture, combined with a glossy, silky appearance, it is found that the pared China grass makes the very best material.

)f course the grass manufacture is yet in very few hands, of which Messrs. ide are the most important; but its development already, even within the last months, has been signally rapid. The market value of the raw material , for some years past, maintained itself at the very high rate of about eighty ds per ton, which price, it is supposed, cannot be much lessened for many rs to come. Two things are certain in this respect: one, that there is now, and be, here a practically limitless market for all the raw grass that can be im- ted, at from £70 to £80 per ton; the other, that under any fluctuations of market, the material is intrinsically so valuable that it will always, in the ire, command a price as high as that of cotton, and nearly or quite as high hat of worsted itself, if not even higher.

Iere, then, is a great and rapidly increasing market for a certain vegetable luction at a very high price. In America we have, on the other hand, vast ts of country, which being in the same latitude and with very much the same te as those districts of China of which the grass is native, we should be

able to grow this production to great advantage. Why not, then, introduce its culture? I submit that these facts constitute a *prima facie* case for the very serious consideration both of the Agricultural Department at Washington and of our enterprising planters and farmers throughout the south.

Messrs. Wade, who have, by the way, been firm friends of our government throughout the recent rebellion, have very kindly consented to furnish me, for transmission to the United States, with a small collection of samples of the China grass in its various stages of preparation, and also of some of the varieties of cloth prepared from it. As soon as they have it in readiness, I shall have great pleasure in forwarding them, with an explanatory list. If possible, also, I shall try to secure a small quantity of the seed.

It seems certain that the manufacture of the grass fibre will be established in our country at no distant day; but in the mean time there is a market in England for all that we can conveniently grow. It is for our planters simply a question of experiment with the seed, having in view the market price of the raw product. Successful experiments have been made very recently in Java and in India, proving that the grass will grow in any climate warm enough for the culture of cotton and sugar, provided the ground chosen be sufficiently moist.

I venture to suggest that further information, as well as quantities of the seed, &c., can doubtless be furnished by our consular officers in China, especially, perhaps, by the consul at Hankow, that place being the chief market for the grass, which is brought thither from the interior, and often from a great distance.

I have the honor to be, sir, most respectfully, your obedient servant,

EMORY McCLINTOCK,
United States Vice-Consul.

GEORGE J. ABBOT, Esq.,
United States Consul, Sheffield and Bradford.

The samples sent by the Messrs. Wade are in greater variety and perfection than any others received at the museum, where they can be examined by manufacturers and farmers. They include the following items: The crude "grass," as imported; fibre in its first stage of preparation; fibre dressed and bleached, in lengths of twelve inches or more, very fine, silky, and lustrous; tufts from the dresser; noils, or short fibre, broken from the long filaments; "slivers" from tufts of dressed fibre, beautifully colored in blue, violet, &c.; worsted yarns, of fibre, silk, and wool, both pure white and a line of delicately mottled samples; grass goods, fibre and wool weft and cotton warp, of the styles known as poplins and mozambiques, of plain lavender and delicate purple and green shades, and in plaids and checks of different styles and colors. These goods are lustrous as silk, delicate in texture, and of great strength. They exhibit a triumph of art in textile fabrication which reflects distinguished credit on the patient and persevering manufacturers who have achieved it and added to the wealth of the world by utilizing an abundant and otherwise comparatively useless product of nature.

Among the specimens of textile fibre submitted to the flax commission recently working under the auspices of this department, "were specimens of cloth, China grass and wool mixed, specimens of raising, specimens of dyeing China grass, very beautiful products." The report of the commission further describes these products: "The fibres of their material are made up of very long cells, which would be ruptured in any attempts to cottonize it, and it should be used as long line. The specimens of cloth presented, in which this fibre was combined with wool, were very beautiful." Dr. Geo. C. Shaeffer, of the bureau of patents, attributes the great strength of the fibre, which is found to be much greater than that of hemp, to the fact that it has fewer breaks of uninterrupted continuity than any other. He says: "The character of the single cells is as follows: In diameter, they exceed those of fine flax, of which, however, many are required to make line of equal length. In cross section they are irregular,

l the greatest diameter is found sometimes in one direction, sometimes in ther, somewhat after the manner of cotton. This gives them an advantage pinning, furnishing a better hold of the fibres upon others than if circular in tion. It is said that specimens of the oriental fabric have been examined, in ich the thread was untwisted, being made up of long filaments joined end to . by some glue or cement."

The *Bœhmeria* was introduced into the United States botanical garden in i5. It was cultivated to some extent, with reference to testing the possibility acclimatizing it in the southern States. It has not been ascertained whether tests were actually and satisfactorily made. It is at present growing in garden of this department from seed received from China in 1865. It proves tender to withstand the frosts of this climate. The latitude of the Potomac evidently its northern limit. The plant grows here very freely during the :r, and attains full size and maturity, but the roots are liable to be destroyed ig winter. Experiments will be made to ascertain whether this plant cannot ;ivated advantageously by storing its roots during winter, and planting ly, as is done with many similar plants.

In China, a light sandy soil in a convenient location for irrigation is selected ts culture. Beds four feet in width are pulverized well, pressed down and smooth, afterwards watered and raked again before sowing the seed, are sprinkled on the surface, in combination with four or five parts of moist rn to one of seed, but not covered with soil. Light mats protect the seeds ring germination, and the young plants where the sun's rays are most powul. The mats are kept wet, and are removed at night.

The beds are kept clear of weeds, and the plants, when two inches high, are rred to a stiffer soil, placed four inches apart, excluded from the light and , and well watered and hoed. The watering is repeated every two days. transplanting, the plants are covered with fresh horse or cow manure. soon throw out their new shoots, which may be removed and planted else- . This mode of propagation, and that of covering, are often successfully l. The roots, which are fleshy tubers, multiply and intertwine, and make ting necessary in a few years.

: seed is sown in February, and the first cutting is made in June. The is gathered three times during the season, at intervals of two months. d crop is of rapid growth and of finer quality than the first or third. are cut soon after new shoots put forth from the root stock. These ts then grow vigorously and constitute the next crop. The seeds are ed by the main shoots, are gathered in October, dried in the sun, mixed damp sand, and covered with straw to keep them from the frost. Before are used they are tested in water, and those that do not sink are thrown is useless. The best seeds are in color a spotted black.

The mode of preparation in China is thus given in Warden's "Linen Trade, nt and Modern:"

"The first year, when the plants are a foot high, they are gathered, and the s of the cut straw are fit for spinning. The *tchou-ma* or China grass may hered three times a year, and when the stems are cut the little shoots ng up from the root stock should be about an inch high. After the large are cut the suckers spring up with more vigor, and soon furnish a second The seed should be sown in February; within four months the first crop be reaped; two months thereafter the second is ready, and in other two s the third and last crop may be cut. The stems of the second crop grow than the others, and yield the finest quality of fibre. After reaping the stocks must be covered with manure, and immediately watered.

stems are split longitudinally with knives, the bark being first removed; lower layer is scraped off, and the under leaves are displayed and rered boiling in water. The first layer is coarse and hard, and only fit for

common materials; the second is finer and more pliable, and the third is the and is used for the finest purposes. After peeling the fibres they are tie skeins, steeped for a night in a pan of water, and then dried. They again steeped in water containing ashes of burnt mulberry wood, then m and chalk, and then boiled in water containing straw, which makes th and supple. They are then dried in the sun, again boiled in pure water, and once more dried in the sun, after which they are joined end to end anc on a wheel, and the long threads thus formed make the warp and woof o cloth to be manufactured. Others prepare the stems by boiling in lime and washing, &c.; others by wetting with dew at night, and sun-drying by and others by the steam of boiling water; so that the mode of softening bleaching the fibre is not uniform."

Recent improvements in the manufacture of this fibre, as seen in received from individuals in this country and Great Britain, have exc siderable interest, and elicited inquiry; in fact, the subject came before the of the United States, in connexion with a letter (enclosing samples of go Mr. William H. Richards, of Boston, and a resolution was adopted call the Senate Committee on Agriculture to "investigate the subject of the seed and cultivating the 'China grass.'"

It is to be hoped that manufacturers will continue their attem to and extend this manufacture, and that farmers, if the effort to accli cessful, will, especially in the south, test the capabilities of our soils for the extensive production of this fibre as a material for manufactur

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ALSIKE CLOVER.

[Translated from the "Hand-Book of Swedish Agriculture," by J. ARRHENIUS, Sec to the Royal Academy of Agriculture, and late Superintendent of the Ultuna Agric Institute.]

ALSIKE CLOVER (*trifolium hybridum*) is a pale red perennial species of which, mixed with grass, is cultivated with great advantage on perman land, whether employed for pasture or mowing. This species of clover best on marly clay with a somewhat moist bottom.

Alsike clover has obtained its name from the parish of Alsike, in U where it was first discovered, and where it grows in the greatest abunda every field ditch. Besides this, it is found wild with us from Skane Helsingland, and also in Norway and Finland, where, on fallow land, we seen it growing luxuriantly. This species of clover is consequently native country, and proves itself, both here and in the border countries, to be a plant, especially adapted to cultivation in our rigorous climate. It until the beginning of the present century that this species of clover cultivated by us, and in 1834 it was introduced into England by Mr. Stephens, under the name of *Alsike clover*. Both by this name, as well that of *Swedish clover*, it is now known not only in England and Sco also in Denmark, Germany, and France, into which countries it is now imported from Sweden.

This species of clover has pale red flowers, a somewhat lank stalk, obtuse leaves, which are less and of a lighter green than those of rea The flower-head, growing from the upper leaf joint, is globular, and f fragrant blossoms supported by stems. These blossoms are at first

ınd subsequently of a pale red, which, when the flowering has passed, rown and somewhat bent. The calyx is smooth, and its tags of equal The seed pods, containing three or four grains of seed, extend out of :, surrounded by the withered crown. The seed is much less than that over, is in the form of a kidney, and dark green or verging somewhat violet. Yellow green seed of this plant is not ripe.

clover does not attain its full luxuriance until the second or third year ıas been sown, and during the first year seldom arrives at any great ' growth. It is therefore best adapted to mixture with grass, for per- ;rass land. It yields, on suitable and fruitful soil, rich and good fodder. :layey soil, especially marly clay, with a somewhat moist position; but rives on cultivated fens and marshes. Alsike clover grows but little ving, and no second crop can be expected from it, as is the case with r. Both in this respect, as well as in the longer time it requires before a full crop, Alsike clover stands after red clover. Its great and unde- lvantage, on the other hand, lies in the fact that it is far more *hardy* clover, and can be cultivated on moist soil, and land that is flooded at mes of the year, on which red clover will not grow. If Alsike clover . with white clover and suitable grass, it yields rich and certain crops, ı cultivated on arable land common red clover may and should be th the seed with which the field is sown, by which the great advantage that, the first year after sowing, two crops of fodder may be gathered, ›nsisting of red clover; and that the following years, in the same pro- s the red clover declines the Alsike clover appears in its place, and :h and certain crops, together with the grass with which it is sown.

eference to cultivation and tending, the same prescriptions will apply, ıin, that are usually given with respect to red clover, with the addition llowing: As Alsike clover, in full vegetation, has a great tendency to should always, when cultivated for fodder, be sown together with grass— ence with meadow or fox-tail grass on marshy land, and with timothy drier soil. The crops by this means become much richer, and the ıports the Alsike clover, so that it does not fall down to the ground and

ike clover seed is not more than about half the size of red clover seed, than about half as much, in measure, of the former is required as of the d may be sown winnowed or in its pods like red clover. Every farmer learn by observation what quantity of seed is required to the acre. es the unwinnowed, or seed in the pod, the quantity required is four or ı greater than if he uses the clean seed.

uality of grass and other kinds of seed that should be mixed with over in sowing, when it is cultivated for fodder, we will specify below. lover seed, both winnowed and unwinnowed, may be sown in the directly after the sowing of autumn grain, or in the spring. When the ıwinnowed it is considered best to sow it in the autumn; it may, how- ı be sown in the spring on the last snow. From the time Alsike clover ın to be cultivated by us, it has been found that "the unwinnowed seed a stronger growth than the winnowed," which has been rightly at- o the fact that "the tender shoot derives, in part, its first nourishment husks that surround the seed." (Annals of the Academy of Agricul- he year 1819, 2d vol., p. 223.)

ield of mixed grass and Alsike clover seed is, on good and rich soil, siderable. Lundström (Hand Book for Farming, p. 294,) considers ›uld yield, with certainty, from two to three tons per acre. At Frötuna, :, in four years, one of which was a very dry year, the average yield ly two tons of Alsike clover and timothy hay per acre; the largest vell manured and lime strewed soil, amounted to between four and five

tons per acre, (Farming Transactions, 2d vol., p. 104,) a yield that cer cannot be expected, excepting on very rich soil and in rainy years, in Alsike clover especially thrives and attains much greater luxuriance ordinary dry summers. It yields, however, in general, good and and both in the middle of Sweden, (especially in Nerike,) as well as at s places in Upland, Gestrickland, and Helsingland, Alsike clover mixed grass is prized as being far more reliable than red clover. Alsike clover y too, better and finer hay, and when ripe the stalk is not so hard as red cl

Gathering the seed of Alsike clover demands especial care, as it is portance to gather seed for home use; the purchase of such seed being a connected with considerable expense. In addition to this, however, the gat of Alsike clover seed for sale may be attended with considerable profit, it in great request in the foreign markets and fetching high prices. It i well known that the gathering and sale of Alsike clover seed is now pros on several estates as the main object, and it is desirable that the producti this seed for sale were more generally carried out, as from it might be d a very profitable article of export.

On one estate in Sweden, where twenty acres were set apart for raisi seed, the average annual production for five years was 133 pounds per while the production one year was 200 pounds per acre. When it is reco that Alsike clover seed generally obtains in the market about double the of the common red clover seed, it is evident that the gathering of the seed must render a very handsome return.

Alsike clover seed is more easily threshed than red clover seed. Whe tivated and threshed together, the Alsike clover seed always comes out pods before the red clover seed. The ripened seed-head of Alsike c however, falls off easier than that of red clover, and therefore in mowing clover that has been allowed to ripen, still greater care must be taken tha the seed of red clover.

The mowing of ripe Alsike clover should always be effected either the morning or late in the evening while it is moist with dew; otherwi riper seed pods fall off with the best and finest seed, however careful mowing may be performed. The mowed Alsike clover is left lying as it and is turned once or twice while moist with dew, after which it is housed dry. In carting home canvas lining should be used in the carts, of suf size to cover the whole of the bottom and a part of the sides of the ca that those seed pods that fall off in carting may not be lost.

If Alsike clover be employed for home use, it may, as mentioned abo used unwinnowed or winnowed, and if in such case it be mixed with the of red clover or timothy grass, no injury would be caused, as, for the r before stated, the seeds of these plants may in any case be advantag mixed with the seed of Alsike clover. If Alsike clover seed is to be sol especially if it is to go abroad, it should be perfectly clean and free fro mixture with other seed. Every grain of seed found amongst another k seed which is intended to be perfectly winnowed, must be considered as seed, and the worst weed in Alsike clover that is left to ripen is timothy Red clover seed may be separated from Alsike clover seed by means of riddle adapted to the purpose, so that the former remains while the latter through the riddle; but this is not the case with timothy seed, which is that even in the last riddling (of which more below) it cannot be separate the Alsike clover seed. It is therefore best in the early summer, if it be ob that the Alsike clover is mixed with timothy, to mow the timothy as soo has shot into the ear, provided the seed of the Alsike clover is intended market.

Alsike clover is threshed like red clover. The experience of the far direct him to the best method of separating the seed from the pod. It m

y passing the straw through a threshing machine, and then carefully ing it from the pods, which must be again (and perhaps more than once) through the machine to open them. But a better method, probably, is sh with the flail; for by this method the seed is disengaged from the pod ls on the floor, instead of being blown away and often lost by the action machine. The pod is also more effectually and surely opened by the use flail.

n the seed has been winnowed on the corn sieve, it is riddled through iddles of different degrees of fineness adapted to the purpose. The t riddle is used first to separate coarse weed seed and anything else that mixed with the Alsike clover seed; then the second; and, lastly, the d finest riddle. If the seed be dusty when it has passed through the dle, then, as a final process, it is slowly and cautiously passed through n sieve once more, by which means the dust is blown away.

BARLEY AND ITS USES.

BY J. M. SHAFFER, FAIRFIELD, IOWA.

EY was cultivated in Egypt as food fifteen hundred years before the era. The inspired historian records that hail was sent upon the land pt as one of the plagues, and by it "the flax and the barley were smit- r the barley was in the ear and the flax was bolled." Wheat was that country in November and December, as soon as the Nile receded, reaped in May. Pliny says that barley is ready for the harvest six after planting, and other grains seven months. There can be no from this early mention of barley in connexion with other cereals, that ed no inconsiderable portion of the food of the people. A "homer of " is mentioned very frequently in the Bible, and contained seventy-five and three pints, while the "ephah of barley" was about one-tenth the y of the homer.

Israelites, under the leadership of Moses, in their forty years journey- om Egypt to Canaan, were rebellious, and could only, it seems, be re- d from their lusts by a continuous display of signs and miracles. In year of their sojourn, Jehovah recounted their acts and His own, and, e them to faithfulness, He draws the following sublime picture of the hich was promised them for an inheritance: "A good land; a land of of water, of fountains and depths that spring out of valleys and hills; of wheat, and barley, and vines, and fig trees, and pomegranites; a oil, olive, and honey; a land wherein thou shalt eat bread without ; a land whose stones are iron, and out of whose hills thou mayest ss." Barley is here found associated with all that delights the eye, min- to the comfort, and tends to render a country healthful, plentiful, and e. This, to the most unreflecting mind, is proof of its importance at y period in the history of the race.

ve hundred and forty-five years before Christ, distinct mention is made "cake of ba y." Gideon overheard, in the camp of the enemy, a com- a dre now a "cake of barley bread tumbled into the host of and unto a tent and smote it, that it fell." Doubtless a dream n inspired of Deity to give assurance to Gideon that the

Midianites should be delivered into his hands. But it teaches, also, the historical lesson that this grain formed part of the food of the people. And this is further illustrated in Ruth's gleaning in the fields of her kinsman, and afterwards at night (because, doubtless, of the sea-breeze which sprang up at that hour) of winnowing the grain and taking the first step necessary for its conversion into food.

In Solomon's reign (B. C. 975) there is the first mention of barley being used as food for the inferior animals. The officers who had in charge the King's revenue bought "barley, also, and straw, for the horses and dromedaries." Solomon also agreed to pay Hyram, King of Tyre, among other things, twenty thousand measures of barley for labor and material furnished by his people towards the erection of the temple. When Jotham conquered the Ammonites he laid tribute upon them in silver and wheat and barley. Thus this grain was a "legal tender," both for labor and revenue, and cannot fail to illustrate the estimation in which it was held at that time.

These facts give abundant evidence that barley was most highly esteemed, forming a prominent item in the wealth and prosperity of the people. It was, 1st, an article of food for man; 2d, for the inferior animals; 3d, a measure of quantity; 4th, an element of worldly prosperity; 5th, a price for labor, and stone, and lumber; 6th, a symbol of Divine interposition in human affairs; 7th, the standard of wealth; and ever since those early times it has been cultivated among the nations of the earth, forming no small proportion of their food, and, in some instances, affording an element of commerce.

GENERAL DESCRIPTION.

There are several varieties of barley in cultivation. The most common are Hordeum Vulgare, H. Hexasticon, H. Distichon, and H. Zeoitron. The first-named is the spring barley; the second is the six-rowed barley; the third, the two-rowed barley; the fourth, the sprat or Battledore barley. They are found in commerce in several forms, depending upon the processes to which the grain has been subjected. *Scotch hulled, or pot barley,* is the grain deprived of its husk in a mill. *Pearl barley* is so called when all the integuments of the grain are removed, and they are rounded and polished. When pearl barley is ground into powder it is called *patent barley.*

COMPOSITION.

Einhof's analysis gives the following results:

The ripe seeds.

Meal	70.05
Husk	18.75
Moisture	11.20
	100.00

Barley meal.

Starch	67.18
Fibrous matter (gluten, Lignin, &c.)	7.20
Gum	4.62
Sugar	5.21
Gluten	3.52
Albumen	1.15
Phosphate of lime with albumen	0.24
Moisture	9.37
Loss	1.48
	100.00

ıbjoined table, compiled by M. Payen, shows the proportions of the principles of the cereal grains:

100 parts of—	Starch.	Gluten and other azotized matter.	Dextrin, glucose, &c.	Fatty matters.	Cellulose.	Silica, phosphates of lime, magnesia, and soluble salts of potash & soda.
....	58.12	22.75	9.50	2.61	4.00	3.02
....	65.65	13.50	12.00	2.[illegible]	4.10	2.60
....	65.43	13.96	10.00	2.76	4.75	3.10
....	60.54	14.39	9.25	5.50	7.06	3.25
....	67.55	12.50	4.00	8.80	5.90	1.25
....	89.15	7.05	1.00	.80	3.00	.90

is cultivated and raised in greater or less quantities in every State of n. This vast area, representing very different climates and every va- ıoil, seems almost equally adapted to its growth. The testimony, how- n favor of a rich, loose soil, and a careful preparation of the land before Delaware and South Carolina produced an equal quantity in 1847; York and Pennsylvania; so Tennessee produced nearly as much as mpshire. This grain will yield an average crop of twenty-three bushels in any part of the country. Some extraordinary crops are recorded. ı in Cheltenham, England, in 1846, drilled in, February 4, five pecks to ; on the 4th of July it was harvested, and yielded fifty-two bushels pecks per acre, weight fifty-five and a half pounds per bushel. A ın, from seventeen grains, obtained 17,235 as the first product; another, əen, obtained 290 ears, which yielded 20,880 grains.

ɔllowing table indicates the price of the cereals at Chicago at the times ɛd, and may serve as a commencement to the inquiry, "Is barley a e crop?"

	Wheat.	Corn.	Oats.	Rye.	Barley.
ɜ-'4....	$1 08 to $2 05	$0 76 to $1 30	$0 54 to $0 84	$0 82 to $1 50	$1 17 to $1 40

able records the highest and lowest prices of grain from September 26th 1st, and only includes number one lots. The prices of number two are ıt lower than number one. Barley seems to be liable to less fluctuation ɛat or rye. Edmund Burke, Commissioner of Patents in 1847, says: he exception of New York, the quantity raised in the United States ɔt be worth trying to ascertain. Its use is mainly for malt purposes. ɛlaims of temperance seem to have contributed very much to lessen the It will be developed, in the course of this paper, that barley has been increasing in favor as a field crop, and that the use of malt liquors has l with gigantic strides among the people. Thus the following state- icates the product of barley for the several years stated in the United 1840, 4,038,315 bushels; 1847, 5,649,950 bushels; 1850, 5,109,054 1860, 15,433,297 bushels; 1863, 17,754,351 bushels.

heat crop of 1850 was 100,485,944 bushels, and in 1860, 171,183,381 or an increase in ten years of about 70 per cent., while the increase of the same period was nearly 300 per cent. The yield in the State of : in 1847 was 3,931,000 bushels, or three-fifths of the entire product

of the United States; while California produced, in 1863, 5,293,442 bushels. And it should be remembered that the crop of 1847 included all the States and Territories, while the estimate for 1863 mentions none of the Territories, and omits all the southern States except Maryland, Kentucky, and Missouri. These figures denote a wonderful increase of this grain, not surpassed, perhaps, by any of the agricultural products of the country.

The principal use of barley is in the manufacture of malt liquors. In 1860 there were returned by the United States census 970 breweries in the northern States, or more than double the number in the whole Union in 1850. The entire quantity of malt liquors was 3,235,545 barrels, with a value of $17,977,135, being more than three times the value of the same product in 1850. Compare these figures with the fact that the whole number of establishments for distilling spirituous liquors in 1860 was 1,138, producing 88,002,988 gallons, and valued at $24,253,176, and the rapid increase can be more readily understood. Again, in 1850, there were of both classes—brewers and distillers—4,854; in 1860 these had increased to 9,058, of which number 6,307 were brewers and maltsters. There are in New York 175 breweries, in Pennsylvania 172, and in California 71. The balance is distributed mostly over the middle and western States. There are but few towns of any considerable population or trade that do not have a brewery as a permanent institution. A census taken at this time would reveal a remarkable increase of the manufacture of beer over the figures returned in 1860. For example, the internal revenue from fermented liquors in the city of Chicago alone, in 1865, reached the sum of $209,959 37. These figures represent over 100,000 barrels of beer and ale sold in that city during a single year. In many small villages there is a beer shop, and beer is becoming, if it has not already reached so prominent a position, the national beverage.

The increase of the use of beer may be illustrated by the following tables, giving the product of barley in 1850, compared with 1860:

In the New England States.

		1850.	1860.
Connecticut	bushels..	19, 099	20, 813
Massachusetts	bushels..	112, 385	134, 891
Vermont	bushels..	42, 150	79, 211
Rhode Island	bushels..	18, 875	40, 993
New Hampshire	bushels..	70, 256	121, 103
Maine	bushels..	151, 731	802, 108
		414, 496	1, 199, 119

In the middle States.

		1850.	1860.
New York	bushels..	3, 585, 059	4, 186, 667
Pennsylvania	bushels..	165, 584	530, 716
New Jersey	bushels..	6, 492	24, 915
Delaware	bushels..	56	3, 646
Maryland	bushels..	745	17, 350
District of Columbia	bushels..	75	175
		3, 758, 011	4, 763, 469

In all the southern States.

	1850.	1860.
... .	56, 132	219, 930

In the western States.

	1850.	1860.
....bushels..	110, 795	1, 036, 338
.........................bushels..	45, 483	382, 245
....bushels..	25, 093	467, 103
....bushels..		4, 716
y.........................bushels..	95, 343	270, 685
....bushels..	75, 249	307, 868
a..... ....bushels..	1, 216	109, 668
....bushels..	9, 631	228, 502
....bushels..	354, 358	1, 663, 868
l..... ....bushels..		1, 108
	717, 168	4, 472, 101

In the Pacific States.

	1850.	1860.
....	11, 516	4, 462, 376

figures show that the "production of barley in all the States more ps up with the increase of population. In fact, the amount of barley each person in 1860 was nearly twice as great as in 1850." Such being it will not be deemed unprofitable to collect in this place, from the ers, a general synopsis of its

HABITS AND CULTIVATION.

readily accommodates itself to any climate, as has already been inti- earing the heat of the torrid zone and the cold of the frigid, and matur- th with equal certainty. It is a native of Syria, as there is the best for its having been cultivated there more than three thousand years he several varieties of two-rowed barley are distinguished from each the quality of the grain and the habit of early or late ripening. These es arise from the effect of climate and situation in the growth of the t is an annual, and belongs to the natural botanical order *graminæ*, but e sown in the fall, when it acquires the habit of late ripening and is ll or winter barley. At different periods particular kinds of barley have great reputation on account of their supposed superior qualities, follow- ne history that has been recorded of divers species of wheat, oats, &c. nce, the Chevalier barley, named from the gentleman who first brought tice, almost caused a mania in countries where this grain was largely d. Samples of it were sold at enormous prices, and the fortunate pos- a few acres of it was the object of much consideration. It seems that r had observed in his field an ear greatly superior to the rest. This red with care and planted in his garden, until he succeeded in procuring seed to sow a field. Upon its diffusion, eminent maltsters and brewers that it possessed more saccharine matter than any other variety, and rists regarded it as heavier in the grain and more productive. An au- es of it thus: "It is one of the greatest improvements of modern times!"

Soon after this mania subsided the Annat barley was introduced and had its supporters and admirers. This was the produce of three ears picked in a field in Perthshire, Scotland, and grown afterwards at Annat gardens, whence its name. It ripened five days earlier than common barley and two weeks earlier than the Chevalier, and was two and a half pounds per bushel heavier than the latter. It had its period of exaltation and decline, as fancy varieties of other grains have had for years.

Barley, like all other grains, is liable to smut, blight, mildew, &c., but its diseases are neither so numerous nor so fatal as those of wheat. Its insect enemies are not formidable, and the grain may be sown with perhaps more prospect of escape from injuries in this direction, and from disease, than any other. Yet Baxter, in his Library of Agricultural Knowledge, writes, "Barley is a tender plant, and is easily hurt at any stage of its growth. It is more hazardous wheat, and is, generally speaking, raised at a greater expense." * * * "There is no grain, perhaps, more affected by soil and cultivation; the same sp exhibiting opposite qualities, modified by the nature of the soil from which it is produced." * * * "Thus the finest samples, the growth of suitable and well-cultivated lands, if sown on a poor and sterile soil, become alike poor in appearance and indifferent in quality." These observations, made in England, will be verified by the experiences of barley growers in America. It is written, "The land that produces the best barley is generally of a silicious dry nature, for a good mellow preparation and free soil are essential to the gro' of malting barleys. Cold, wet soils, which are peculiarly retentive of mo are ill adapted to the growth of this grain, both in reference to its weight its malting qualities." There is infinite variety in the composition of the soils in the vast region in which barley is grown in the United States; yet everywhere it is considered a profitable crop, and is found fit for malting, whether grown in Maine, Florida, Iowa, or California. There are no statistics accessible which give any comparative statement as to the relative weight of barley, or its relative malting qualities, as modified by soil and location. It has been asserted that very much of the barley grown in the United States would not be used in England in the manufacture of ale or beer, it being thought to lack some of the properties essential to the production of first rate malt. Precise figures are wanting to determine the exact differences, if any, which exist in barley grown in different locations.

Barley may be propagated by seed sown broadcast or in drills. The quantity varies from two and a half to five bushels per acre when sown broadcast, depending on the nature of the soil, cultivation, time of sowing, &c. In rich, mellow, well-tilled lands, the smaller quantity will answer; while on poor soils, with late sowing and indifferent tillage, a larger quantity will be found necessary. Being an early ripening grain, it should be sown early. The authority from which many of these suggestions are taken, insists that great care should be taken in the choice of seed. It should not be of a reddish color, as a great part of it will not vegetate. It should be of a pale hue, lively and uniform. The finest samples and plumpest grain should be selected, as these throw up strong, healthy stems, capable of resisting the effects of inclement seasons, and, under favorable circumstances, putting forth with great strength and vigor. The compiler of the United States census has this paragraph:

"Barley requires good cultivation. It delights in a warm, active, fertile soil. It does not do well on sod-lands. In England it is usually sown on light, sandy soils, after a crop of turnips that has been eaten on the land by sheep. The droppings of the sheep enrich the land, while the small feet of the sheep consolidate the light, porous soil. In this country it appears to flourish on heavier soils, especially if they are thoroughly pulverized. At all events, the soil must be well drained, and the crop sown in good season in the spring. Our season is so short, and the roots of barley extend, as compared with winter wheat, over

ll surface, that it is exceedingly important that the soil contain a lib-y of plant food in an active condition."

ıre is required in harvesting barley than in any other of the grain crops. be allowed to become ripe, but not dead ripe. It is very apt to be on account of wet weather, causing germination of the grain, and the .t depreciation of its value as malt. Hence it should not be stacked he barn unless thoroughly dry. None should be put away when the on it, as, from the softness of the stem and the tendency of the ears to t will be heated, the spear will be destroyed, and maltsters will pur-ıly for grinding, and then at greatly reduced rates. A writer in the ield makes some suggestions from which the following are condensed: must be ripe, but not "rotten-ripe," in order that it may germinate Wait until the red streaks which run longitudinally on the ripening ppear, the head begins to hang down, and the straw assumes a golden ɜn cut it, and if sufficiently long tie up into small sheaves, in the event ɜather. This better protects it from staining than if lying all about. cked loose gets into better condition than when tied up; the sweating ıiform and the sample a shade mellower. Still the evidence is in favor .nd the practice is steadily gaining ground. It is also recommended ıreshing with a machine, as the germinating spear is bruised, and is ıjured by it as if heated in the mow. It is likewise important, on ac-he fineness of the texture of the chaff, that the grain should not be very large heaps without daily examination, to prevent heating and on. The necessity for all these cautions will readily appear when s of malting is described in another part of this paper.

BARLEY AS FOOD FOR MAN.

be added to what has been already intimated, that the ancients—the , Jews, and East Indians—cultivated barley for food in the earliest he common variety came to Europe by way of Egypt, and in Greece ls of barley were cultivated for food in former times. It was at one ıeral demand in England as bread corn, and is even now, for this ed to some extent on the continent. The bread is not especially nu-ı has a dark color and strong savor that are not particularly pleasant. ɜdore barley furnishes an excellent meal. Pliny says that barley was ncient of all cereals used as food, and quotes the Hordearii—the barley name given to the sword-fencers, in allusion to their allowance or pen-rley. Count Rumford, in his essay on "Feeding the Poor," regards ıl, when used for soup, as three or four times more nutritious than ɔur. But a reference to the table on page 357, showing the proximate of the cereals, exhibits the fact that while wheat contains 22.75 parts .nd other azotized matters, barley contains but 13.96. Gluten contains nd on this account has been called the vegeto-animal principle. Now .onstrated by Magendie, the great French physiologist, that gelatin, ımen, when fed separately, do not have the power of nourishing ani-ny length of time—they invariably waste away and die; but when ɹd on gluten alone, they thrive well and live long. It is thus conclu-ıe more gluten contained in food, the greater will be its nutritive qual-ence the nutritive equivalent of wheat is much greater than that of arley soup, in many places, forms an occasional dinner dish; but the ɜ use is very circumscribed. Barley bread is unknown to native

AS FOOD FOR DOMESTIC ANIMALS.

While barley is less nutritive than wheat, it is twelve and a half per cent more so than oats. From the earliest antiquity it has been employed as food for cattle, and after the introduction of wheat the Romans used it largely for horses. It is regarded as the best article for fattening swine, after they have been put up for that purpose. The flesh is not only more tender, but it increases on boiling. It forms excellent food for poultry. London dairymen use the growing crop in spring for pasturing cows; it comes early and increases the milk. It is a fine crop for sheep, and in England, when fed off early, as in April, it will spring up again and make a good crop in August. It is good for horses when fed in the spring—sparingly at first—and mixed with oats. As early as 1602 it was sown in Martha's Vineyard, and by the colonists of the "London Company," in Virginia, in 1611. Samples of the grain were sent to Holland from the colonists of Manhattan island, as evidence of their prosperous condition. In 1796 it was the chief agricultural product of Rhode Island. Doubtless, at that early day in our history, its uses as food for all the domestic animals were well understood. John Spring, writing from Indiana, in 1853, says: "The green grain affords an excellent pasture during winter, especially for colts and calves, as they injure the ground less by tramping than other and older stock. The straw is saved for winter feeding to cattle, and answers well for horses when cut and fed with the grain crushed into coarse meal. Barley is also valuable for hogs when ground and made into swill, and fed during the first stage of fermentation; or the grain may be soaked in water until it is fully swollen, and then fed to them. D. J. B. wrote, in 1855, (Agricultural Report,) "In Egypt, as also in all parts of the East, it has been used in an uncooked state, from time immemorial, as the common food of horses, where the use of rye and oats is unknown. However prejudiced farmers may be against it as horse food, from the belief that it is too heating to these animals when kept hard at work, they cannot avoid being convinced of its excellence in this respect, when they consider that in the countries where they are the most remarkable for their good qualities, as well as for their beauty, they eat no other kind of grain." Mr. Boardman, writing on the agriculture of Maine, in 1862, says: "When ground for feeding purposes, it is found to be a superior article for fattening hogs, and also for feeding horses, milch cows, and poultry." Authorities might be multiplied to an indefinite extent to illustrate its value as food for the domestic animals. When it is considered that barley is raised with equal facility as the other grains, that it grows luxuriously in almost every climate and soil, that its average yield per acre is greater than wheat, and, though less than oats, that it possesses relatively greater nutritive properties, that it is usually less in danger of diseases or from the depredations of insects, that it is alike applicable to all kinds of farm stock, it certainly recommends itself to a more general use in this direction.

AS A THERAPEUTIC AGENT.

Barley is recognized as officinal by the medical profession throughout world. It contains much less of the flesh and blood making principles than wheat, and hence is useful as a demulcent and emollient for invalids in febrile cases and inflammatory disorders. In affections of the chest and urinary organs, requiring depletion and the avoidance of a stimulating regimen, it is highly and deservedly esteemed for its soothing effects. Its starch offers more resistance to the action of the gastric juice than that of wheat, and its meal is more laxative. Added to three times its weight of wheat flour, it gives an excellent quality to infants' food, the constipating effect of the former being counteracted. From the well known tendency of barley to act on the bowels, it should not be used in cases where there is diarrhœa; or in establishments wh

nplaints prevail. There are two decoctions of barley for use among the ıeir preparation is very simple, and they will be found highly beneficial ndicated above.

MALT LIQUORS.

r far the greatest proportion of the barley crop is consumed in the ure of malt liquors. Some figures have already been presented, exhib- magnitude of the increase of consumption of ale, beer, &c., in this also the great increase of the number of persons employed as brewers ıters. It may be profitable to add here a column of figures showing the mportations of malt liquors for the years indicated:

Table of ale, beer, and porter imported into the United States.

....	$241,894	1855..................	$783,573
....	257,440	1856..................	710,897
....	365,492	1857..................	849,840
....	567,009	1858..................	631,134

le of ale, beer, porter, and cider exported from the United States.

....	$62,449	1855..................	$61,012
....	51,755	1856..................	61,817
....	66,223	1857..................	94,599
....	64,090	1858..................	98,408

›ortations, value of................................	$4,407,279
›ortations, value of................................	550,353
ılance in favor of importations......................	3,856,926

the same years were imported bushels of barley as follows:

....	95,663	1855..................	155,782
....	109,192	1856..................	1,770
....	109,461	1857..................	2,924
....	73,700	1858..................	9,755

most regular decrease of the importation from one hundred thousand in 2, and 1853, to less than ten thousand in 1858, shows that the country ached independence in this regard. This table may be also profitably with that given on page 358. It is to be regretted that figures of a like , bringing down the statistics to the past year, are not attainable. They ubtless show that the astonishing increase of the barley crop has rela- ıed the importation of the grain, and perhaps, also, of foreign ale, porter. And though a high authority has asserted that the best barley the United States would not be used by a London maltster, yet the ı which American beer and ales are received by the people, and their ıdation for use of the sick by the best talent of the medical profession, to show that they are equally good; and hence there would be no for importing them from abroad.

MALTING.

brief history of this process may prove interesting. The operation of by which the grain is prepared for conversion into beer, ale, &c., is of four distinct steps, namely, steeping, couching, flooring, and drying. is steeped in water for about two days, when it absorbs moisture, bly, softens, and adds about forty per cent. to its weight. As

soon as it is easily penetrable by a needle the water is drawn off, and the grai is submitted to the next process, which is *couching*. This means placing th soaked barley in heaps two feet high, where it is allowed to remain about thirty hours. In this situation the grain acquires a temperature considerably al that of the surrounding atmosphere, but as the heat in such large masses woul not be uniform, the germination would be more advanced in some parts i others, and it is now subjected to the third step, which is *flooring*. This is by throwing the grain on large, airy, but shaded floors, in layers a few i thick, and in this position it is frequently turned over with a shovel, thus secu uniformity until the acrospire (a name given by maltsters to the new growth reached almost to the other end of the grain from which it started. At this stage the gluten and mucilage have mostly disappeared, and if the germin were allowed to proceed further the leaf would start, and the saccharine m developed in the process would be destroyed by the growth of the plant, t ruin of the grain for malting purposes. Great care is necessary to suspen germination at the proper time. At the completion of this stage the grain is removed to the kiln, which is frequently prepared with a zinc or tin floor, per forated with many holes. The grain is spread two or three inches thick subjected to a heat gradually rising from 100° to 160°, or even higher. T are two distinct objects in this process: first, to dry the grain; second, prevent the recurrence of germination by destroying all vitality in the plant Malting is not performed in hot weather, the temperature selected being usu under 45° Fahrenheit, else the grain would become mouldy. Great change occur in the chemical constituents of barley after being subjected to this pro as is shown by the following analysis:

	In 100 parts of barley.	In 100 parts of malt.
Resin	1	1
Gum	4	15
Sugar	5	15
Gluten	3	1
Starch	32	56
Hordein	55	12
	100	100

BREWING.

Barley thus malted is converted into beer by a process termed brewing. T like malting, consists of several different operations: First. *Grinding*, or redu the malt to a coarse powder. Second. *Mashing*, or thoroughly stirring the powder in water at a temperature of 160°, with no more water at first than is suffici to soak the malt. After an hour, more water is added at a temperature of 1 this is allowed to remain three or four hours, and is then drawn off; it is a solution of the saccharine matters. Third. *Boiling*. This is done in e copper vessels, furnished with steam-pipes. In this operation the hops are introduc and the boiling of the mixture is continued with frequent stirring. As a rule, one pound of hops is added to a bushel of malt for the strongest of beer; for common beer, about one-fourth of that quantity. Fourth. *Stra* by passing through a cistern which has a metallic bottom full of holes. I important that this should be performed very carefully to have a clear, cloud article. Fifth. *Cooling*, by exposing in broad shallow cisterns, over which rents of air can pass freely. Sixth. *Fermenting*. When the liquid is co temperature of 56° to 64° it is pumped or conducted into large open vats; the y is added, usually about one gallon to 100 of the wort. In order to pre escape of the carbonic acid, the aroma of the hops, and the alcohol,

fication, it is, when it has reached the proper point, transferred to .eads; the fermentation goes on, and the froth is allowed to escape oung-hole. The loss is made up by adding fresh supplies of beer. e process of fermentation is completed, it is transferred to hogsheads side with rosin to exclude all air, corked tightly, and put in the cellar, re it can be taken for the consumer.

llowing is an analysis of some of the best-known European and Amer-s:

	Water.	Malt.	Alcohol.	Carbonic acid.
'	76.03	15.88	8.08	0.01
ter	88.74	5.98	6.10	0.18
ondon	89.85	4.50	5.65	
ia lager beer	92.16	4.36	3.40	0.08
ger beer	91.30	4.66	3.76	0.13
ger beer	91.80	4.65	3.44	0.11
ager beer	90.95	4.70	4.34	0.04

BEER FROM MALT.

is a thirst-quenching, refreshing, exhilarating, intoxicating, and slightly beverage;" thus writes Dr. Jonathan Periera. Notwithstanding this ority, there has been some grave questioning as to its intoxicating and qualities. That it is thirst-quenching and refreshing will not be denied, ter which is the menstruum of its active properties is made slightly tonic dition of hops. But learned judges and juries have sagely decided, as xicating power, on both sides of the question, in cases arising under bitory liquor laws of the several States. It almost staggers belief when nce in such cases is read. Enormous quantities, amounting to many ve been drunk by individuals in the course of a day without any unting of the intellectual or entanglement of the muscular powers. ort time ago Rev. H. W. Beecher convulsed an audience with laughter norous relation of the vast quantities which persons accustomed to it med without appreciable intoxication. Yet, in like manner, individual are not wanting in which impossible potations of whiskey, wine, brandy, have been taken without damage to the brain or the locomotion. But est personal experience will satisfy the observer that beer will intoxi-is no argument against the proposition that large quantities can occa-e drunk with impunity. Isidorus and Orosius give a description of a use by the Britons and Celtic nations in these words: "The grain is water and made to germinate, by which its spirits are excited and set ; it is then dried and ground, after which it is infused in a certain quan-ater, which, being fermented, becomes a pleasant, warming, strength-d intoxicating liquor." Why not? It possesses alcohol; there is n it to counteract the effect of that substance; alcohol will intoxicate; ains alcohol, therefore it will intoxicate. In fact, it is drunk for its ing and intoxicating effects, and, except as a medicine, as hereinafter d, for no other purpose. The taste is bitter, and, to the novice, very greeable, and not many gallons would be consumed for the sake of its n on the palate alone. When men drink together in token of social beer has the advantage of taking a much larger quantity to produce t y alcoholic drinks, and the meeting can be drawn out to a o the degree and measure of their friendship.

Brandy has 53.39 parts of alcohol; rum, 53.68; gin, 57.60; Scotch whiskey, 54.32; claret wine, 15.10; Malaga, 18.94; Hock, 12.08; Tokay, 9.88, &c., &c. To this principle alone all liquors owe their intoxicating qualities. Because, forsooth, beer and ale contain the same principle in less quantity, is it a reason that they will not intoxicate? Some years ago a bitter newspaper war was waged between the Scientific American, which opposed the use of beer, and some physicians and chemists who favored it. It would hardly be profitable to review this controversy; only one fact is mentioned: that one savant claimed that lager beer had nutritive qualities equal to those of milk! In Bavaria it is almost an essential article of diet among the laboring classes, and in many instances it takes the place of animal food. When a gallon a day or more is drunk, little other food than bread will be required to satisfy the appetite. But what then? Next come apoplexies, palsies, and other dangers from disorder of the nervous centres. It is quite unreasonable to suppose that it would conduce to health and longevity to deluge the stomach with a gallon of fluid in order to procure an ounce of nourishment. The stimulation, like that of every other unnatural kind, is but momentary, and is followed invariably by its period of depression. Thence arises a necessity for greater stimulation—greater quantities of the fluid to produce it—and so on, until the depression gains the advantage over it, or until the nervous system is overwhelmed with disease, death follows. The word "nutrition," by Pereira, is well and sensibly qualified by the term "slightly." In Dr. Charles A. Lee's edition of this author's work on Food and Diet, there are the following sound ideas: "The practice of taking a moderate quantity of mild malt liquor, of sound quality, at dinner is in general not only unobjectionable, but beneficial. It is especially suited for those who lead an active life, and are engaged in laborious pursuits. For sedentary and inactive it is less fitted. * * * * With bilious and dyspeptic individuals it frequently disagrees, and by such, therefore, should be avoided. In plethoric constitutions, especially where there is a tendency to apoplexy, it is objectionable," &c., &c. The opinion of Dr. Benjamin Franklin is well known, but his words will bear repetition in this place. When a journeyman printer in London, he endeavored to convince his fellow-workmen t if they would eat a penny loaf and drink a pint of water with it, they w derive more strength from it than from a pint of beer; and in proof of t e states as follows: "On my entrance I worked as first pressman, conceiving I had need of bodily exercise, to which I had been accustomed in A ca. I drank nothing but water. The other workmen, to the number of fifty, were great drinkers of beer. I carried occasionally a large form of letters in each hand up and down stairs, while the rest employed both hands to carry one. They were surprised to see, by this and many other examples, that 'the American aquatic,' as they used to call me, was stronger than those who drank porter." Dr. Lee adds that malt liquors are more deleterious in their effects upon the system than ardent spirits. "They certainly stupefy the brain, render the blood too viscid, load the cellular tissue with fat, and so modify the vital cohesion of the solids as to render wounds extremely difficult to heal, and accidents, which in water-drinkers would be attended with little or no danger, very certainly fatal."

This declaration must be received with some grains of allowance. Intemperance in beer-drinking, like excess of any kind, is undeniably detrimental to health; but a very moderate supply of pure beer will aid digestion, quicken the powers of life, give elasticity to the body and mind, and will not induce any of the terrible results above named. In certain forms of dyspepsia it is a valuable adjuvant to other remedies; and in some cases of debility, requiring a mild tonic and gentle stimulant, it has been found a great benefit. But too great care cannot be exercised in even the moderate use of a stimulant, however mild, for the tendency of frequent indulgence is always towards drunken-

. Hence, as soon as their administration as a medicine is no longer de- ded by the condition of the patient, its further use had better be abandoned.

ADULTERATIONS.

'here can be no doubt of the general adulteration of all malt liquors. In ;land and other countries, where heavy penalties are imposed, and an in- sing vigilance practiced to detect and punish such frauds, by a system of ction of all malt liquors manufactured before exposed to sale, the practice ery common. How much more in this country, where there are no laws on ›ject, and no officer to carefully analyze the products of the brewery? years ago Professor Mapes, of New York, analyzed the beer from a dozen ent breweries, and all were found adulterated with noxious substances. It l that the sale of drugs to brewers is a profitable part of the trade. This ectly infamous. Cocculus indicus, (fish-berry,) nux vomica, (dog-button, which strychnine is obtained,) are some of the delectable substances found r. These are potent poisons, and the brewer found using them should be rned at once in one of his own vats. The British Parliament passed a law revent this nefarious business. The following is an extract: "No druggist, dor of or dealer in drugs, or chemist, or any other person, shall sell or de- to any licensed brewer, dealer in or retailer of beer, knowing them to be ı, or shall sell or deliver to any person on account of, or in trust for, any ı brewer, dealer, or retailer, any liquor called by the name of or sold for ring, from whatever material the same may be made; or any material or aration other than unground brown malt, for the darkening the color of ts or beer, or any molasses, vitriol, honey, quassia, cocculus indicus, grains aradise, Guinea pepper, or opium, or any extract or preparation of molasses, ny article or preparation to be used in worts or beer for or as a substitute lt or hops; and if any druggist shall offend in any of these particulars, ı preparation, &c., shall be forfeited, and may be seized by any officer of e, and the person so offending shall forfeit *five hundred pounds*."

ınder this law very many druggists and brewers were brought to grief, and the practice continues. Unless the American public are ready to admit the aculate purity and innocence of American brewers, they must be content le drinking their beer, to cherish the belief that they are at the same time lling some narcotic poison or damaging medicine. In view of the unprece- l growth of the barley crop, of the great increase of the number of maltsters brewers, of the vast unknown quantities of beer that are drunk in every and almost every town on the continent, it is the dictate of sound wisdom, he attention of legislators should be called to the subject of the adultera- of our malt liquors, and severe penalties should be inflicted as a preventive.

the compilation of this brief text I am especially indebted to the "New an Encyclopædia," the "American Farmer's Cyclopædia," "Carson's s," "Dr. Lee's Edition of Pereira's Food and Diet," and to the Agricul- ı Reports of the Patent Office from 1847 to 1860, and, from that date to 1864, ıe valuable reports of Hon. Isaac Newton, Commissioner of Agriculture.

MANURES AND THEIR APPLICATION.

BY SIMON BROWN AND JOSEPH REYNOLDS, M. D., CONCORD, MASSACHUSETTS.

NATURE is always just; she never requires more of her workers than she furnishes them the means to accomplish. She requires the soil to produce plants only in proportion to the plant food she supplies to it. How does she manage with the trees of the forest? The seed is dropped upon the soil and comes up a small and tender plant, requiring but little food. Its foliage is annually dropped about its roots to protect and, by its decay, to nourish them. As it increases in size it yields more foliage, a large portion of whose substance is made up of the gases of the atmosphere condensed in the vessels of the leaves and thus conducted to the earth. The increased amount of food which the increasing growth of the tree annually demands is thus, by its own action, annually supplied, and the supply is always in advance of the demand, so that when the trees have become too large, the mould is often accumulated to a great depth. In ancient forests, whose monumental trunks stand as landmarks of the centuries, the amount of nourishment which they require is inconceivably great; but the masses of foliage, the decaying limbs, and the broken boles decaying in the soil, supply them with abundant food. How wonderful is this process of nature, by which the supply is increased in proportion to the demand! This is true vegetable philosophy. Says Stockhardt, "Good farming consists in taking large crops from the soil, while at the same time you leave it better than you found it." This is what nature does in the forest, on the prairie and natural meadow, until man interferes with her operations. His method is wholly unlike hers. He plants a hundred apple trees upon his field; he cultivates the soil, and perhaps manures it while they are small; when they have become large enough to yield a hundred barrels of fruit, and at least a hundred barrels of leaves, he carries away the fruit, and the winds scatter the leaves. Here are two hundred barrels of vegetable matter annually removed from the soil. Could this amount of vegetable substance remain and decay upon the soil, he might reasonably expect its fertility to be sustained. But, no! He expects the soil to yield the annual crop of fruit and leaves, and to supply, in addition, the material for the increasing growth of the trees; and the larger they grow the less cultivation he gives them, and the less manure he supplies to the soil. He takes two tons of hay from his acre of virgin soil. Can he reasonably expect another crop as large unless he applies something to protect and nourish the roots of the grass? He takes two tons of stover and fifty bushels of corn from his acre. Will he take as large a crop the next year? Unless the supply returned to the soil be in some proportion to the demand made upon it, the most fertile soil will become exhausted. A virgin soil, in which a large quantity of humus has been accumulated, may endure such a drain for a few years, but the rich prairies of Illinois, under continual cropping, are yielding an annually diminishing harvest. Even the valley of the Nile and the cane-brakes of the Mississippi, unless renewed by the deposit from the overflowing water, would in time lose their fertility. This theory is confirmed by universal experience. In the new soils of the eastern and northern regions of our country scarcely two or three crops can be taken from the land without convincing proof of the truth of this philosophy. In all this se-

з soil, except upon the river bottoms, is comparatively thin and sterile, effect of every demand upon its resources, like that of a demand upon ›urces of a poor man, becomes at once apparent. The great law of sbandry is, to return to the soil an equivalent for the crop taken from rotation of crops, and by deeper ploughing, tolerable crops may be ob- ›r a longer period, but the unproductive and deserted fields in some of hern States and in the older southern States show that this is only a ith time, in which time is sure to win.

rrive, then, at the conclusion that there can be no good farming without In northern climates there is an additional argument for the use of Many of the most valuable crops require naturally a longer season r growth and maturity than the climate allows, and it becomes neces- push them forward by stimulating manures.

COMPOSITION OF MANURES.

being the facts, it is obvious that the manure heap is the bank from he farmer must draw his working capital. What, then, is manure? re said it is plant food—any substance upon which the plant feeds in Anything which the plant derives from the atmosphere, although it ιtes to its nourishment, is not denominated manure. We confine the substances applied to the soil. The term is said to be derived from the hand, and is confined to substances applied to plants by the hand. ›d of plants consists, *first*, of carbonic acid, or carbon combined with By this chemical combination carbon is rendered capable of being ıto the vessels of plants. The framework or chief bulk of all trees ıts is composed of carbon, and, as it decays more slowly than most of r components of vegetables, it is left in the process of decay more or e from all other elements. The bulk of all the solid excrement that hrough animals consists of carbonaceous matter. Starch, gum, sugar, l woody fibre consist largely of carbon. Peat consists of decayed veg- tter, chiefly carbon, combined with earths, acids, and salts. All the :es composing the compost heap, whether animal excrement or decayed e matter, as muck, grasses, straw, beans, vines, fruits, grains, seeds, or egetable growths, consist largely of carbon, either combined with or rapidly coming into a condition that will enable it to combine

d, Salts. Various salts enter into the composition of plants, as the lime, potash, soda, silex, magnesia, sulphur, iron, and manganese. ı and hydrogen also are important elements of plants, but as they are ly volatile they are applied in the form of ammonia, which consists of o gases. Ammonia is never found in plants, but is decomposed either oil or in their vessels before its constituents are appropriated to their hese salts are all found in the secretions of animals, especially in the cretions, being derived by them chiefly from the vegetables on which d. Ammonia is abundant in animal secretions, being formed in them :hemical union of hydrogen and nitrogen. The elements of ammonia enter into the composition of plants, but they operate as stimulants to reting and assimilating vessels. Decaying animal substances, as flesh, ›ol, feathers, skin, and gelatine, yield a large amount of ammonia, it d in the process of putrefaction by the union of their nitrogen with ı n of water. All these salts are also found in the soil, the source ıcn they are ultimately derived by animals. By salts we mean lkalies, and metals, chemically combined with acids, as carbonate and of lime, sulphate and muriate of potash and soda, silicate of lime,

sulphate of iron and manganese, &c. These all come into the category of plant food, and are essential elements of manures.

Third, Acids. These are important elements in manures. They are seldom, with the exception of carbonic acid, found in a free state, but combined with the earths, alkalies, and metals. Their chief use appears to be as solvents for these substances. Salts compounded of them enter sparingly into the composition of vegetables. The acids themselves are believed by some vegetable chemists to be decomposed, and to enter into new combinations, thus assisting to form the acids found in the fruits and juices of many plants.

Fourth, Gases. Another important element of plant food, and consequently of manure, consists of various gases combined with the soil, or dissolved in water. They are sulphuretted hydrogen, consisting of sulphur and hydrogen; carburetted hydrogen, consisting of carbon and hydrogen; phosphuretted hydrogen, consisting of phosphorus and hydrogen; and carbonic acid gas, consisting of carbon and oxygen. The sulphuretted and phosphuretted hydrogen occasion the peculiar and offensive odors given off by manures in a putrefying state. Ammonia exists in manures in a gaseous form, except when combined with sulphuric or other acids, or with carbonaceous or aluminous substances, which have the power of condensing and retaining it.

Fifth, Water. Water, either pure or in combination with acids or alkalies, is the universal solvent employed by nature. If pure water cannot dissolve a substance, nature adds an acid or an alkali, and sometimes a third substance, to enable it to effect the solution. Water cannot dissolve silex, but, by first dissolving a quantity of carbonate of lime, it becomes able to dissolve silex, and form silicate of lime. Water contains, in solution, earths, alkalies, acids, and gases. It is everywhere present when animal or vegetable growth is going on, supplying to the vessels of their organs, in that state of minute division which can be effected only by solution, the materials which they require to construct their different tissues. Besides this, it enters largely into the composition of the blood and juices of all organized beings, and readily allows itself to be decomposed when either its oxygen or hydrogen are wanted.

The above-named substances, viz: carbon, salts with alkaline, earthy and metallic bases, sulphur, iron, manganese, acids, gases, and water, are the principal elements of manures. They are found in different proportions in different manures, and are rarely all found in any one manure. The different effects of different manures is owing to this fact, as well as to the difference in the soils to which they are applied. Carbonaceous manures applied to a soil consisting largely of humus will produce but little effect upon the growing crop except as a mechanical means of lightening the soil. Such soils require alkalies or matter containing nitrogen. On the other hand, sandy soils, which are deficient in carbon, are greatly benefited by manures containing a large percentage of carbon. Hence we may learn the advantage of mixing soils containing different elements. The peaty soil does not afford the silex and lime needed to give firmness and strength to the culms of grass and grain. The sandy soil does not furnish the carbon needed to construct their growing frame work. A mixture of the two will furnish all the materials needed. Manures containing a large proportion of nitrogen stimulate plants to a large and vigorous growth. Those containing phosphorus, or phosphate of lime, contribute to the size and plumpness of the grain and seed—hence the benefit of combining them both in the culture of the garden and field. That may be considered a manure which supplies any want of the soil, or of the growing crop. But a perfect manure is that which supplies all the wants of all crops in all soils, or a manure containing all the elements above named. To use such a manure in all cases would be a waste of material, for they are not all wanted, perhaps, in any one case. To determine what elements of manure we can most economically use, it is necessary to ascertain the condition of the soil, and the elements of nutrition required by the crop

be raised upon it. Several of the elements of plant food, as we have seen, e volatile, and will not remain permanently in the soil. Others are readily luble, and will soon be washed out of it. If they or any of them are not anted for the immediate crop, there will be a waste of material. Could we ake use, in every instance, of only those elements that are wanted to enable e soil to produce the present crop, or those that will remain permanently in the il for the use of future crops, it is obvious that much material would be saved. cience and experience may afford us some aid, but the difficulties in the way ' determining the wants of the soil and of the plants we cultivate, and of lapting our manures to these results, are so great that we must be content to mit to the loss resulting from our inability and ignorance.

THE SOURCES OF MANURE.

Carbonaceous matter, as we have seen, is derived from the natural decay or hemical decomposition of vegetables. Vegetables collected into masses, as aves, wood, grasses, straw, the stalks and stems of all plants, fruits, grains, ots, &c., under favorable conditions of temperature and moisture, rapidly unergo, first, the fermentation; and, secondly, the putrefaction process. Where iere is too much or too little heat, or too much or too little moisture, fermentaon will not go on. The fibres of vegetables thus collected in masses, under avorable circumstances, soften and swell, and become permeable to air and ater. Their salts, starch, gum, sugar, gluten, and extractive matter are dised, their carbon combines with oxygen, and carbonic acid is formed and trates the whole mass. This acid combines with the alkalies that are pres- as potash, lime, soda, magnesia, and ammonia, and carbonates of potash, , &c., are formed. Certain elements in the mass soon take on the action of efaction. This process is owing chiefly to the presence of elements contain- nitrogen, as gluten and other matters of animal origin. All animal substances ass rapidly into the process of putrefaction, and the larger the proportion of uch substances mingled with the vegetable masses, the more rapidly putrefacion proceeds. Hence the addition of animal manures to vegetable composts acilitates putrefaction. By the process of putrefaction hydrogen also is rapidly eveloped, and combines with phosphorus and sulphur when these are present, orming sulphuretted and phosphuretted hydrogen. When the surfaces of these utrefying masses are exposed freely to the atmosphere, these gases, which are ery volatile, are rapidly dissipated. To prevent this, substances should be pplied which have the power of absorbing and retaining them. Carbon, when early pure and dry, has a strong affinity for them. The addition of dry charoal, or of peat, will absorb large quantities of them. When these gases are hus absorbed their presence ceases to be indicated by their peculiar odors. The ulphates of lime, iron, and zinc have a similar power, hence their value as dedorizers. These sulphates have also the power of decomposing carbonate of mmonia, displacing the carbonic acid, and forming sulphate of ammonia, which not volatile. Chloric and nitric acids will also decompose carbonate of am- i, forming with it chlorates and nitrates of ammonia, which are soluble in ater, as are also salts which they form with the other alkalies. Vegetable ompost, then, when the decomposition is complete, consists chiefly of carboaceous matter combined with gases and salts.

By a process in many respects similar to that above described, vegetable tances are decomposed in the digestive organs of animals. The fibres are uted by the teeth, and fitted to be pervaded and softened by the fluids u d in the stomach and intestines. A large portion of the starch, gum, gluten, and salts is dissolved out, and taken up by the lacteal vessels of I l, and serve the purposes of nutrition, while the remainder, mixed with e ju of the animal, containing various salts, is ejected. This process is

accomplished much more rapidly than the ordinary process of vegetable deca; and the substance resulting is mixed with a large amount of animal matter, whi fits it for rapid putrefaction. When the necessary conditions are present animal matter, which pervades the mass like leaven, sets up the process putrefaction at once. These two processes, vegetable composting and the fee ing of animals with vegetables, are the sources from which carbonaceous ma are chiefly derived. Vegetables reduced by the process of digestion, alth they have parted with a large portion of their nutritive elements, yet, in con quence of the condition to which they are brought, and the additions which th have received, are more valuable as manures than when, without serving t purposes of nutrition, they are reduced by the ordinary process of decay. I the slow decomposition of vegetables is always going on in nature, and thus c generation of plants affords nutriment to those that come after it.

The carbonaceous matter resulting from the decay of vegetables is not taken up as it is formed. Masses of it have accumulated in swamps, basins, a meadows. These accumulations, mingled with more or less of insoluble eart constitute muck or peat, and furnish an almost unlimited amount of carbonace material fitted for the immediate use of the cultivator. The difference whicl found in different accumulations of this material is owing in part to the diffe in the vegetables from which it has been formed, and in part to the difference the soils upon which it rests and by which it is surrounded. In some depo the matter is almost purely carbonaceous; in some the composition is comple in others but partial. But the most essential difference in different deposits muck is, that some contain acids, or acids combined with minerals, while oth are nearly or quite free from them. These acids are the carbonic, humic, cre and apocrenic. When deposits of muck are underlaid by clay, or receive wash of clay beds in their vicinity, and iron is present, which it often is in form of bog ore, the sulphate of alumina, which is the basis of clay, is dec posed, and the sulphuric acid combines with the iron and forms sulphuret iron, or pyrites, which is often found in muck in sufficient quantity to impair value as a fertilizer. When any of these acids abound in muck it is unfit to used in a simple state. Alkalies are the proper correctives, and of these l seems to be the best adapted to remedy the evil. Quicklime, mixed with p has the effect of rapidly rendering it pulverulent and light. Its influence se to extend through the whole mass, like that of yeast through the whole mass dough, while at the same time it combines with the acids and decomposes salts of iron, forming salts of lime, which themselves are essential to the gro of many plants. Muck, when free or nearly free from acids, may be used itself with great benefit on light, sandy soils, or on any soils from which vegetable matter is exhausted; or it may be composted with stable manure, asl guano, or animal matters, with peculiar advantage, since it has, as we h already observed, the power of absorbing and condensing the gases arising fi the putrefaction of these substances. Such composts are adapted to nearly the uses of the garden and field.

No substance is so well adapted to composting with night soil and urine dry muck, since it deodorizes these manures and retains all their valuable ments, and renders them manageable and easy of application, affording at same time the dilution which is necessary for the safe application of con trated manures. Composted with putrefying fish, muck forms an exceedi valuable manure. The best mode of preparing muck for use is to thro from its bed in the autumn, and leave it exposed to the action of the frost the succeeding winter. If it is to be composted with lime or ashes it used the following spring. But if it is to be composted with stable night soil, or animal matters, it is better to let it remain in the heap unti following autumn, when it should be deposited in the barn-yard or cellar. mixed, from time to time, with the drippings of the animals. It shou

n sufficient quantity to be used freely as a deodorizer about the prem-
ever or wherever it may be wanted. It will thus become charged
and salts, and be converted into a highly valuable manure, which
en and for fruit culture has perhaps no equal. Many skillful farmers
compost of one-half good muck and one-half stable manure fully
orn culture to pure stable manure.
le composts, animal excrements, and muck are then the chief sources
ceous manures. With these, as we have seen, are combined various
salts which are essential to vegetable growth, either as elements of
r as stimulants. These may also be found in more concentrated
in smaller bulk, capable of more easy and direct application to grow-
Variously combined and condensed, these fertilizing elements con-
numerous articles known in commerce as artificial manures. All
ng their growth take from the soil more or less mineral matters.
ire them in large quantities. Such plants are said to exhaust the
ch they grow. The small grains, which appropriate in their culms
much silex, lime, and potash, are instances of this class. The ele-
which we are now speaking are all soluble, and are washed out of the
he better the soil is worked and the finer the tilth, the more rapidly
ake place—and, unless they are frequently renewed, the cultivated
exhausted of them.
o their small bulk they are easily applied. Nitrogenous manures
an guano, night-soil, poudrette, urine, hair, wool-waste, fish manures,
substances generally. The phosphates are bone-meal, superphos-
lime, and Mexican guano. All these are combined with mineral
alkalies, and it is to these that is due whatever permanent value
ires possess, the other elements being so soluble and volatile that
s are immediate and temporary.
connexion we may mention the saltpetres or nitrates, a class of ma-
hich little attention has been paid in this country. Earth contain-
of potash is often found in caverns, where it has been accumulating
rotected from the weather. Nitrate of soda is found in extensive
ew Jersey and in the northeast part of the State of New York.
ntities of it are imported from Chili. The nitrates may be manu-
tificially by means of nitre beds. These are formed by means of
nimal manures mixed with potash, lime, and soda. They are pro-
the rain by roofs open on all sides to the air. The mixture is kept
er degree of moisture, and frequently stirred to expose new surfaces
sphere. The alkalies, thus treated, combine with the nitrogen of
fined in the porous mass, and by a somewhat complicated process
lime, potash, and soda are formed, and the whole mass becomes im-
with them. The principal use that has hitherto been made of the
thus treated has been to leach them, by which the nitrates of soda
are dissolved out. When they are reduced to a solid state by evap-
y are used for the manufacture of gunpowder, and for other pur-
e arts. The whole mass, unleached, applied to the soil, is a very
ure; and there is no doubt that large quantities of most valuable
ight thus be prepared. Whether it can be done economically, expe-
can determine. Mineral substances are restored to the soil by the
ication of lime, gypsum, ground bones, ashes, salt, sea-weed, and the
lime and soda. The effects of such substances are very apparent,
when the application is followed by crops into whose composition
y enter, as wheat, oats, potatoes, &c.

PREPARATION OF MANURE.

We have already seen that most of the natural manures contain elements that are volatile and soluble. It is obvious that when such substances are exposed to the rain and snow the soluble portions will be dissolved and washed out, and that if they are exposed to the free action of the sun and air the volatile elements will be dissipated as fast as they are evolved, and this will be nearly in propo:tion to the elevation of the temperature. The free action of the air will not only dissipate their gases, but will also carry off the moisture that is necessary to sustain chemical action. Hence it follows that in composting and preparing manures for the soil, whether they consist of stable manures or those mixed with soil, or with muck or other vegetable or animal substances, they should be carefully protected from the weather. Such exposure subjects the cultivator to a loss he can ill afford. The most convenient arrangement for the protection of manures is the *barn cellar*, and this is coming rapidly into use in the eastern and northern States. In every section of the country in which barns are required for the storage of forage and the protection of stock in winter we would recommend the barn cellar as both a convenient and economical arrangement. It should be easy of access, of sufficient height, be built of brick or well-pointed stone walls, and with a bottom impervious to water. It should be protected from currents of air, and if possible secured from frost, so that fermentation and putrefaction may go on through the winter. Material should be provided and placed in or near the cellar, and be frequently spread over the fresh droppings of the animals in sufficient quantity to absorb the liquids and to take up the gases as fast as they are formed. Some careful farmers spread the material daily over the droppings, and thus a thorough mixture is secured. The materials, whether they consist of muck, loam, or leaves, should be as dry as possible. In this condition they will retain much more of the liquid excrement, are more easily pulverized, and will mix more readily and thoroughly with the droppings. There should be as much muck or other material used as will be sufficient to absorb all the liquid and render the solid excrement dry enough for convenient manipulation. When the floor of the cellar is tight. this will be found to be no less in bulk than the mass of solid excrements. When cattle are highly fed more than this will be required. When the urine is taken off by a drain into a reservoir, for separate use, a less quantity will be required. We know of no better rule with respect to the quantity of material to be added in the composting of stable manures than the above. If the mass thus gradually formed in the cellar is allowed to freeze, very little decomposition takes place during the winter. But if the frost is kept out, the laboratory will be kept at work, more or less actively, according to the temperature, through the entire winter, and the manure will be fit to be used in early spring. It will become mellowed and rendered fine by its own internal action, and will not require so much labor in overhauling for the sake of breaking and pulverizing it. If it is kept frozen, or near the freezing point, the animal excrement will be in the condition of green manure, and will not so readily combine with the soil, or act so immediately on the growing crops.

The farmer who is not so fortunate as to have a cellar should cover his manure heap with a roof at least, to protect it from the rains. If it is not covered, it would be well to remove it into the field during the winter, and deposit it in as large heaps as possible, that it may present the smallest surface to the weather, and cover it neatly with soil, that may protect it from the rain and absorb the gases as they are formed, which will be but slowly during the cold weather. It is wise economy to deposit in the autumn a quantity of dried muck near the spot where it is intended to deposit the manure from the barn. This should be mixed with it as it is hauled and used to cover the heap. Compost aps thus formed should be overhauled in the early spring, and the ingredients

l mixed. Scarcely too much importance can be attached to overhauling ma-e in the spring, and mixing its ingredients and making them fine, but this uld be done before it is heated by fermentation, as soon as the frost is out the heap. It should then remain a few days until it begins to be warm, en it may be overhauled again. In this state it readily combines with the l, and comes into contact with the roots of the growing plants. It is an ex-lent plan to mix gypsum with it as it is being overhauled, or to sprinkle the ip from time to time with a solution of copperas, or with diluted sulphuric d, as these will combine with and retain the ammonia as it is formed in the trefying mass. A pound of acid, or five pounds of sulphate of iron, may be d with a barrel of water.

Ashes or quicklime should never be directly combined with green manure, urine, or Peruvian guano, or any substance that contains a large percentage carbonate of ammonia, as they will combine with the carbonic acid and set e the ammonia, which will, of course, be lost, unless there is some other sub- present that has a strong affinity for it, which may combine with it and n it. When lime or ashes are to be applied to the same soil with stable ure, or compost containing a large share of such manure, the best method is plough in the manure and spread the lime or ashes broadcast on the surface, apply them in the hill. When hoed crops are to be cultivated, ashes may be ofitably applied to the surface at the first hoeing and worked in with the hoe. anures should be applied to the soil with all the elements belonging to their nstitution. If a portion of these elements is diffused into the atmosphere, it obvious that that portion has been lost, and that is usually the most active stimulating portion.

Some farmers prefer to introduce stable manures into the soil in a crude state. this condition it is in a state of integrity. All its elements, as they are de-loped, are absorbed by the soil, and we are not surprised that those who have t experienced the advantages of composting in a cellar should prefer this e of application. We have already referred to the combination of muck n it-soil when speaking of muck as a deodorizer. Human excrement, ing urine, contains a great number of elements. In addition to carbona-tter, it has been shown by analysis to contain chloride of soda, or com-salt, chloride of potash, hydrate of potash, soda, lime, magnesia, iron, osphoric acid, sulphuric acid, silica, urea, and urates of lime and ammonia. he composition is doubtless much varied by the food; the number of pounds urine is at least double that of the solid excrement. An immense amount of terial is annually wasted in our cities, which, if it could be deodorized preserved, would be of inestimable value to the farmers and gardeners in vicinity, and would add incalculably to the resources of their vegetable . Probably there is no better mode of preparing this highly valuable nce known at present, than to mix it with a sufficient quantity of peat in ry state, to absorb its moisture and destroy its odor. If a quantity of plaster, a little diluted sulphuric acid, be added to this composition, we shall have one the best manures that can be composed for most crops, and especially for ind fruit crops. It is said that the Chinese make use of clay, dried and rized, to mix with night-soil. This has considerable power as a deodorizer, very tenacious of gases and moisture, and when dried peat cannot be obtained may be substituted for it with much advantage.

owl manure.—Almost all families in the country, and many in all our vil-s, keep hens to supply themselves with eggs and poultry for the table. droppings of fowls are of much more value than is generally supposed, and a little pains a large amount of manure, which may be called domestic guano, y be prepared. Fowls, from the force of instinctive habit, always resort to same place to roost, which should always be under a roof, where convenient sts should be provided for them. Under the roosts a quantity of dry peat or

good loam or coal ashes should be spread to receive the droppings. Once in a few days an additional quantity should be spread over them. Let this be continued through the year, and where a dozen or twenty hens are kept quite a heap of valuable manure will be found at its close. It is best not to disturb it until just before it is wanted for use, when it should be worked quite fine and well mixed and thrown into a heap. If gathered oftener, for the sake of cleanliness, it should be preserved dry, in boxes or barrels. For early garden vegetables, as lettuce, peas, sweet corn, and cucumbers, no better manure can be found. As it contains a large per cent. of ammonia, it should be exposed to the air as little as possible, and should be covered to a moderate depth in the soil. A small quantity of this manure added to the hill where corn is planted, will bring forward the young and tender blades rapidly and vigorously.

LIQUID MANURES.

The saving and use of liquid manures is deserving of more attention than it has hitherto received in this country. When cattle are kept in stalls through the winter, and especially where soiling is practiced, and cows are kept in the stall through the year, the floor should be so arranged as to conduct the urine into troughs beneath it, which will convey it into a reservoir in the cellar or outside the barn. This can be done at very little expense. The accumulated urine may be pumped into a water cart, to which a sprinkler is attached, similar to those used for watering the streets. If it is pumped in through a strainer the sprinkler does not become clogged, and it may be immediately conveyed to the field and distributed as a top dressing upon grass or grain. When the soil is not deficient in carbonaceous matter there can probably be no better top dressing applied. It is not as permanent in its effects as the solid excrements, but more immediate, and may be applied two or three times a year. For raising green crops for soiling it is invaluable. Here there is a constant and abundant supply of the material. It should be applied after the grass has started in the spring, and after each cutting. Its application is attended with less expense of labor than that of composts. The cost of the necessary apparatus for saving and distributing it is very small. As a dressing for land to be planted with turnips it is very excellent. As a top dressing in the spring or during the summer for pasture lands it is, perhaps, superior to any dressing that can be applied. If the undiluted urine is thought too strong, it may be easily diluted in the field if water is at hand. An intelligent farmer who has been using it as a top dressing for grass during the three years past, considers it fully equal in value to the solid excrement of the same animals; and he states that one man can dress as much land in one day with liquid manure, as two men can in two days with solid manure, without taking into account the expense and labor of collecting and mixing the material of which the compost is made. If this statement be correct, it must be more economical than any compost as a dressing. When applied to lands in which humus is deficient, it will not probably be found to meet all the wants of the crops. Its effects will be much like those of guano on similar soils. It remains to be determined by experience whether it is of equal value with superphosphate of lime, ashes, plaster, guano, or other concentrated manures as a top dressing. These may all be applied with equal facility and with even less labor, and some of them, as lime and ashes, are more permanent in their effects. In applying liquid manure the labor of one man and a horse will top-dress one acre a day within a quarter of a mile of the barn. This would be worth not far from three dollars. Will the value in any other dressing add as much to the value of the grass or grain crop as will the dressing in question? This can be ascertained only by experiment.

English farmers are making extensive application of manures in a liq form. They have in some cases dissolved solid manures in large quantities or

:r, and applied them as a top dressing. They seem to be in favor of di- them largely, and their effects may be due in some measure to the quan- .y of water in which they are dissolved. Liquid manures may be applied so rong as to injure tender plants. It is well known that pure guano, applied rectly to the germinating seed, operates as a caustic upon its softened sub- ance, and entirely prevents its growth. The same thing is true of ashes and ne under certain circumstances; and it is also true of urine, for when this is plied in large quantity upon young and tender grass, it will often kill it en- ely. There is no doubt that the English mode of application is the safest, it by it the labor is much increased; and we are hardly prepared to believe at the fertilizing power is increased in proportion to the dilution, as is said to : the case with homœopathic medicines. Within certain limits the immediate fects of fertilizers may be and are increased by dilution. The particles of luble bodies are more finely distributed, and are readily taken up by the dicles of plants and carried into the circulation. Indeed, this is doubtless the ason why liquid manures are more active than solid. Water must always be resent to render manure, of any kind, effective. Potash, soda, lime, and all her salts, must be in a state of solution before they can be absorbed by plants. orticulturists well understand that such substances can be applied with more ediate effect in a state of free solution. When the sulphates of potash, soda, onia are applied in solution to strawberries, after the fruit is set, the t upon the size of the fruit is sometimes truly wonderful. Applied in a form, in a season of drought, they have but little or no effect until the ing rain dissolves them, when they will operate sometimes with almost cal effect. Guano, applied as a top dressing, is often wholly inoperative s the application is followed by rain. Hence, when this fertilizer is ap- 1 in this way, it should be in the early spring, while the ground is still wet, r during a rain, or upon an April snow, in order that it may be dissolved and ed into the ground, and thus be protected from the atmosphere as well as e applied to the roots of the grass and grain. There can be no doubt that and ashes, applied in the form of lime water and weak lye, would be more diately efficacious than when applied in the ordinary way, but it would be ed with more labor and expense. How far this mode of applying manure e found economical in this country, where labor absorbs so large a part of vorking capital of the cultivator, each must judge for himself. Our own on is that, with the exception of urine from the stable and the house, which be easily saved, and which is apt to be lost, in great measure at least, by y other plan of management, the application of liquid manures will be con- chiefly to the garden. For garden uses, soapsuds and the sewerage of the are usually sufficient to fertilize a garden that will supply the family with g bles. All the liquids from the house should be conducted to a reservoir. garden engine and a water cart, with a few feet of hose and a sprinkler t ed to it, will be all the machinery needed. The soil should be well ikled before the seed is sown, and at such times subsequently, during the owi season, as may be convenient or necessary. A little practice will soon ne needful skill in the application. If plaster, or a solution of sulphate iron, is added occasionally to the reservoir, it will act as a deodorizer, while same time it adds to the efficacy of the manure.

.ch excellent manure might be prepared in this way if every farmer and cultivator of a garden would take the pains necessary to provide a suit- e voir. The material that now runs to waste, and is for the most part a ound the premises, might thus be made to add no inconsiderable ; to the products of the soil. Each family, of five hundred families in a y town, might save manure to the value of five dollars annually that is w ed. This would amount to twenty-five hundred dollars, or one dollar each individual in the town. This would be sufficient to pay the highway

tax and build one good school-house, or it would pay the entire school tax of most towns of that number of inhabitants. If such would be the value of this saving to a town of five hundred families, its value to the whole country must be a very large sum. As the population increases, the demand for garden vegetables and fruits will increase. This demand will lead to better and more thorough culture of all such products. This, in its turn, will lead to the careful preservation and application of all the means of enriching the soil. The crowded populations of Asia and Europe are far in advance of us in this respect. The low price of land has led our people to rely, hitherto, more upon the inherent energies of the virgin soil than upon the appliances of art. Our systems of agriculture have been based upon this, and when the fertility of one field is so far exhausted that it will not yield a satisfactory return for the labor expended upon it, we resort to another; but as the value of land increases we shall turn our attention to preserving and increasing the fertility of the soil we continuously cultivate. Then we doubt not that means of enriching the surface soil will be found often beneath the soil itself, and that a great amount of material that now runs to waste will be saved and applied as fertilizers to the soil.

SPECIAL MANURES.

In our discussion thus far, we have had direct reference to natural manures prepared on the farm, but we have introduced several observations relating to another class of manurial substances, which have become articles of commerce and trade. These are called *special manures*. By common consent this term has come to mean something used as a fertilizer or as a stimulant that is not derived from the ordinary sources of the farm—that is, from the stable and compost heap. The substances included under this term may be divided into commercial and artificial manures. The principal commercial manures are the guanos, bones, wool-waste, hair, woollen rags, and the oil cakes. The Peruvian and Mexican guanos, and more recently guanos from Baker's and Jarvis's islands, are, we believe, the only manures of this class imported into this country. Those that may with strict propriety be called artificial manures, are prepared on a large scale, in manufactories devoted to this special purpose, and are found for sale in all the agricultural stores. They are bone meal and flour, superphosphate of lime, muriate of lime, soda ash, sulphates and nitrates of potash, soda and ammonia, and various poudrettes. Most of these manures, as they are received from the manufactories, need little or no preparation, but are ready to be applied directly to the soil, or to be composted with other manures, or to be dissolved for use in a liquid form. Some of the old Roman writers speak of the value of ashes and lime, but seem not to have had the remotest idea of many of the important substances which have been brought to act so important a part in modern husbandry, and which do actually increase the value of many of our crops to no inconsiderable extent. One after another these specific agents have been discovered and introduced, until they are by some thought indispensable in good farming. That some of them are of great value, giving not only a present but permanent power of production to the soil, there can be no doubt. That such are the effects produced by the use of bones, was long ago learned by the farmers of England, who increased their wheat crop by the agency of bones and thorough drainage, from the low standard of fifteen bushels per acre up to forty, with an average of above thirty. So great was the demand for them that they soon became an important article of commerce, and British ships navigated every sea, and visited the remotest lands, to secure cargoes of bones. Our own shores were stripped of thousands of tons, that went to fertilize the British isles while our own acres were starving for them. They not only visited the hunting grounds of Africa, but gathered up the bones of countless herds of cattle on the pampas of South America, that had been killed for their hides.

, and tallow alone. Even battle-fields, where men and brutes had found a mon grave, were carefully gleaned of the decaying relics of unnumbered iers and horses, who thus found a too early resurrection from the tomb, and e exchanged for British gold. All these were transferred to the soil, and, a an improved husbandry in other respects, gave it a productive power which ever had before. And it was not a spasmodic power, but a permanent and le one, that has brought the most luxuriant crops for more than half a ry. The example of our transatlantic friends at length awakened our people to a sense of the importance of bones as food for plants, and some them have been gathered and converted into superphosphates, bone meal, bone flour, to be used both as a fertilizer and to be mingled with the food our domestic animals. The value of bone as a fertilizer may be readily rred from its composition. Fresh well-cleaned bone contains about thirty-ht per cent. of animal matter. The remainder is mineral matter, nine-tenths which is phosphate of lime and one-tenth carbonate. The animal matter is great value on account of the nitrogen it yields to the growing crops, and phosphate is especially favorable to the development of seeds and grains. s on account of the phosphate of lime that bone dust is so beneficial to dairy ls, as milk and cheese both contain it. There is about half a pound of sphate of lime in ten gallons of milk. Bone dust is an excellent manure wheat, for although this is a silica plant, in whose ashes silicate of lime unds, the presence of phosphates in the soil is essential to the formation of seed. If the soil be rich in silicates, but deficient in phosphates, excellent w will be obtained, but the grain will be small in amount. It will be a crop er calculated to make bonnets than bread. It has been estimated that one red pounds of bone dust is equal to twenty-five or thirty hundred pounds ble manure. Although bones contain such fertilizing elements, they must nely pulverized in order that they may be immediately available in the on of plants. It takes often twenty or more years for small fragments one of the size of a hazelnut to become disintegrated in the soil, and yet fragments are often seen in the bone dust of commerce. Means have been overed to reduce them to paste or flour, of which we shall speak hereafter.

s auxiliaries or helps in the management of soils, we can unreservedly mmend a careful and judicious use of the special manures. No exact rules however, be prescribed for their employment. The nature of the soil, its ure or mechanical condition, the degree of moisture it has, the state of the on, and the time of its application, all have so much to do with them, that ct rules would often prove inapplicable if they were given. The farmer remember that plants feed only upon matter in solution—that is, the bone, ter, potash, or ashes, must be dissolved before the roots can avail themselves ts nutriment. If, therefore, any of the special manures are applied to a soil acking in moisture as not to render them soluble, they remain inactive. So soil for the want of drainage is constantly charged with cold water, which s the temperature so low that putrefaction cannot take place, plants derive little benefit from manure of any kind, even if a redundance of it is applied. se simple statements will perhaps show why so many experiments with ures are set down as failures. They are used under such circum- as to render them completely inoperative. They should be applied upon that are fine and porous, so that atmospheric action will be free among the es, warming and moistening them. Under these circumstances the fine or flour of bone, guano, superphosphate, or any of the special manures, become softened by the dampness of the soil, then warmed by the genial of the sun, which easily penetrate it because it is light and fine, and by ntation and putrefaction are soon converted into a soluble form, all ready appropriated by the roots of the plants.

reated in this way special manures are quick in their action, giving plants

an early and vigorous start, and pushing them rapidly forward until their roots find new means of support in the soil, which they penetrate in all directions. In rows of corn or vegetables where they are applied, the foliage will be found more luxuriant, and of a richer and deeper color, than in rows where none had been placed. These conditions must be observed or they will frequently prove a failure. They should also be near the surface, where they will be kept moist by the dampness of the atmosphere and summer showers. Even when these conditions are observed, it will be well to apply them just before a fall of rain, in misty weather, or during a gentle shower.

GUANO.

Guano has been more extensively used as a special fertilizer than any other, perhaps than all others. It consists of the excrement and exuviä of birds dropped upon the same spot through long periods of time. The birds select some island of the ocean where their favorite food abounds, congregate upon it in vast numbers, and there rear their young. This is also their resting place by day and night. The consequence is that all their droppings, when they are not upon the wing, fall upon the same place. Long before the keel of any vessel divided the waters of the vast Pacific, or the foot of man trod upon its islands, these birds were collecting their food from its prolific bosom, perpetuating their kind, and adding layer upon layer of their excrement, until some of them are now vast accumulations of guano, twenty, forty, or sixty feet in depth. It is calculated that the deposits of it in south and middle Peru amount to more than twenty millions of tons. The best guano is found in those tropical latitudes where it seldom or never rains. This vast mass, however, is not entirely composed of the digested droppings of the birds. It contains also feathers, bones, and the animal matter which comes from the decay of the birds themselves. The great difference in the results obtained from the analysis of different samples of guano indicates that age, exposure, and other circumstances greatly affect its properties. Sound guano contains a large amount of ammoniacal salts as well as phosphates. In birds, the secretions of the kidneys, as well as the intestines, are carried into the cloaca, where they become mixed and combined. The food of the sea-fowl, which produces this substance, is almost wholly fish, on which account their excrement is much richer in nitrogen than that of birds or animals that feed on vegetable food. Its value depends essentially on this fact.

COMPOSITION OF GUANO.

Professor Norton gives the composition of a few leading varieties in the following table:

Variety.	Water.	Organic matter and ammoniacal salts.	Phosphates.
Bolivian	5 to 7	56 to 64	25 to 29
Peruvian	7 to 10	56 to 66	16 to 23
Chilian	19 to 13	50 to 56	22 to 30
Ichaboe	18 to 26	36 to 44	21 to 29

This, it is evident at a glance, is an extremely rich manure; the quantities of ammoniacal salts and of phosphates are remarkably large. The Ichaboe guano contains much more water than the others, because the climate in that region is not so dry as on the west coast of South America. It is also more

osed, giving usually a stronger smell of ammonia. The Pacific guanos ry little smell of ammonia, but if they are mixed with a little quicklime tly heated, the odor becomes extremely pungent.

recent importations are from two islands in the Pacific discovered by ans, and called Baker and Jarvis islands. Says Liebig, "The guanos ese islands are distinguished from others by their acid reaction and greater ty. They contain only a small quantity of substances containing nitro- uric acid, and small proportions of nitric acid, potash, magnesia, and a. The Baker's island guano contains as much as eighty per cent., the hirty-three or four per cent., of phosphate of lime. The latter has forty- cent. of gypsum. These guanos approach nearest in their composition dust. Their condition enables the farmer who wishes to accelerate their o convert them into superphosphate, by the addition of from twenty to five per cent. of their weight of concentrated sulphuric acid.

rding to an analysis by Voelker, one pound of guano was found to be equal ounds of farm-yard manure, and that it contains these elements in the most rated form, and permits the application of them to the field more conve- than farm-yard manure, as it may often be done after putting in the seed. lifference between the Peruvian and Mexican guanos is, that the former a larger proportion of the ammoniacal salts and the latter a larger pro- of the phosphates. The especial value of the former may be seen in the of the straw and culms in grain and grass; while the value of the latter ested in the increased volume and plumpness of the grain and seeds. h prices at which the guanos have been held for the past few years have diminished their use in this country. At a reasonable price they might to great profit on our partially exhausted soils, especially when used in tion with carbonaceous matters. If good guano can be furnished at the at from forty to fifty dollars per ton, it would find an extensive demand. able of increasing, under judicious application, the crops of grain, pota- l grass at least thirty-three per cent. Owing to its comparative clean- d facility of application, it is peculiarly suited to horticultural and floral ment.

uano is shamefully adulterated, and the farmer not only frequently loses ey he pays for it, but loses his labor, the use of his land, and the crop ught to grow upon it. Professor Johnston mentions an instance of four which sailed from English ports, ballasted with plaster of Paris intended xture with the guano when the vessels were loaded at the islands. An- orite material for adulteration is umber, so that in some cases the farmer en hundred pounds of umber to the ton, and only five hundred pounds . In order to protect the purchaser from such outrageous impositions, essor gives the following as tests:

he drier the better; there is less water to pay for and transport.

he lighter the color the better; it is not so completely decomposed.

it has not a strong ammoniacal smell, it ought to give off such a smell spoonful of it is mixed with a spoonful of quicklime in a glass.

When put into a tumbler with water and well stirred, and the water and ter poured off, it ought to leave little sand or stones.

is the effect of guano upon crops?

first place, is it permanent? The popular notion is that it is not; but it must extend to two crops, because if its ammoniacal salts are nearly d the first year the phosphates will continue to act beyond one year. r Johnston says guano very much resembles bones in its composition, ones are known to benefit crops in an entire rotation, guano ought to do . The chief difference between bones and guano is this: that the guano ammonia ready formed, or forming, so to speak, while the bones con- tine, which forms ammonia only during putrefaction. The ammoniacal

part of the one, therefore, will act early; of the other, after a longer period, while the permanent effects of the remaining ingredients of both will be very much alike. The guanos, then, having the most ammonia will have the greatest present effect, while those having a larger amount of the phosphates will be the most permanent. Nearly all the authorities we have consulted agree in the conclusion that three or four hundred pounds of pure guano is worth as much as fourteen to eighteen loads of ordinary manure. An instance of its energy is stated by Professor Norton, where eight hundred pounds being put upon an acre of turnips, they all grew to tops and produced no bulbs. Even the succeeding crop of wheat was so rank in its growth that the grain was miserable. The Hon. Marshall P. Wilder, well known to the country as one of its leading pomologists, applied eight hundred pounds per acre, and harvested from it sixteen hundred bushels of carrots. The following statements were communicated to us several years since by David Mosely, esq., of Westfield, Massachusetts. Mr. Mosely is a thrifty, observing farmer, who manages his estate with singular ability and success. He says (New England Farmer, vol 8, p. 238) that three hundred pounds of guano, in one instance, increased the crop of corn fifteen bushels per acre; that in another $53 worth of guano gave a profit of $77; that in a third instance he manured a field of seven acres with fifteen cart-loads of good stable manure, and on five acres of it sowed one hundred and fifty pounds of guano per acre. The portion on which the guano was put yielded twenty-three bushels per acre more than the remainder of the field. In a fourth instance he sowed two hundred and fifty pounds per acre, which increased the crop twenty bushels an acre, and it was ten or twelve days earlier for the guano. He further states that three hundred pounds have given him more bushels of potatoes than twenty loads of manure.

HOW AND WHEN TO APPLY GUANO.

1st. As we have already stated, guano is best applied in damp or showery weather.

2d. It should be put on grass lands in the latter part of March or the early part of April.

3d. When applied to land just ploughed, it should be immediately mixed with the soil by harrowing, or, as Mr. Mosely states, by brushing it with birches or other bushes.

4th. When grain is sowed early in the autumn, only a portion of the guano intended to be applied should be then used, but the balance should be put on in the spring. If the whole is applied in the fall the grain sometimes becomes too luxuriant and is liable to be injured by the frosts.

5th. Guano should be applied with reference to the present crop only, and not with the purpose of benefiting succeeding crops.

6th. Guano, before application, should be mixed with five or six times its weight of charcoal, fine soil, or dried muck. We once caused four tons of Peruvian guano to be spread upon a floor and mixed with six times its weight of fine black muck in layers of the two articles. After it had remained in this condition two weeks, it was overhauled and the pile evened up and covered with clean muck. The same operation was repeated in two weeks more. At planting time, two or three weeks after the second overhauling, it was shovelled into carts, taken into the field, and a moderate handful thrown into each hill. The corn not appearing in due time, examination was made into its condition, when it was found that most of the kernels had sprouted, but as soon as the tender germ had reached the guano it perished. Of the sixteen acres to which it was applied not a tenth part of the corn came up. Our next conclusion, therefore, is—

7th. That guano should on no account be allowed to come in contact with the seed.

h chemists have recommended guano as a means of increasing the f the sugar cane upon the partially exhausted soils of the West India and we see no reason to doubt that it would give a greatly increased the cotton plant, especially on soils that have been cultivated several tnat most important crop. It should be applied largely diluted with ı loam, or marly earth, in the furrow at the time of sowing the seed. . be spread over the whole width of the furrow, which should be eight :hes wide. It would give a rapid growth to the young and tender hich would thus attain a larger size and become more deeply rooted e approach of the dry season. Experience alone can determine what can be applied with advantage. Probably about the same quantity quired for corn will be required, viz: from two to three hundred pounds, ; to the condition of the soil. Guano is often applied by gardeners and rists in a weak solution. If it should be found to injure the germs of u plants it might be applied in solution at the first hoeing, upon the surıe ground.

ɑportation of guano into Great Britain in the year 1845 was two huneighty-three thousand and three hundred tons, and in 1851 two hunforty-five thousand tons, at a cost that year of about ten millions of So that, with the experience of six years in its use, the farmers in that hought it profitable to expend ten millions for this special fertilizer in year!

BONES AND SUPERPHOSPHATES OF LIME.

as we have already said, in their entire state—that is, containing :latine of the periosteum and cells which compose their framework, and t and earths with which these cells are filled—consist of about thirtyts animal matter, forty-four parts of phosphate of lime, three per cent. :sia, soda, and other salts, with twelve per cent. of moisture. If a quanıtire bones ground to a fine powder, are placed in a box or other vessel n temperature and slightly moistened, putrefaction will be quickly set mmonia will be rapidly evolved. It is obvious that in this condition st be a highly stimulating and active manure, and must contribute to a growth of the stalk and an abundant crop of grain and seed. The bone flour now in the market purport to consist of the entire bone reduced nt degrees of fineness. Could we be sure that the glue-makers and cers have not had a share of it, we should consider it the most valuable manufactured manures. As long as we have farm stock, cattle, sheep, ıd horses, they must have bones, and as phosphate of lime exists so ı them, it must be provided for them in the food they eat. Accordingly ɩent in all cereal grains, in leguminous plants, and many other vegetasoil of course furnishing it to them. It is not only, then, the animal e in bones, the gelatine and fat, that makes them a good manure, but ral part is of essential service to some crops, especially if the soil be at ent in phosphate of lime. Bones contain, as we have seen, forty-four . of phosphate of lime. But phosphate of lime is almost insoluble. ɔones lying exposed to the weather for years, and only slowly crumbthe soil. The animal matter has long since wasted out of them; phosphate of lime remains. How can this be rendered soluble, so n speedily yield its valuable elements to the growing plants? Neutral sist of acids completely saturated with some base. Thus, sulphate of ;ypsum, consists of sulphuric acid combined with all the quicklime it up. The new compound thus formed no longer presents the sensible s of either of the ingredients. The acid of the one and the alkali of the not perceptible to the taste, and the caustic property of both is no longer

present. The compound, then, is neither acid nor alkaline, but neut many neutral salts, as the gypsum of which we are speaking, are spar slowly soluble in water. By the addition of an excess of the acid used in them, they become more soluble. By removing a portion of the base, or earth, from the compound, the same effect is produced; for if there was j ficient in the compound to neutralize the acid, the removal of a part lea acid unsaturated or in excess. The salt will not then be neutral, but salt, or, in chemical language, a super salt. Phosphate of lime, as i bones, is a neutral salt, consisting of one part of phosphoric acid and t of lime. It may be rendered soluble by adding phosphoric acid, so that u no longer be neutral, but an acid or superphosphate; or the same produced by the addition of any other acid having a sufficiently str for lime to take away a portion of it from the phosphoric acid. The lime no longer neutralizes the phosphoric acid, and the compound b acid or superphosphate. Sulphuric acid has so strong an affinity for if it be mixed with neutral phosphate of lime it will seize upon and c one of the three parts of lime which, as we have said, enter into its c and will form with it sulphate of lime, or gypsum. This mixture of pho of lime with sulphuric acid will then consist of superphosphate of lime and or gypsum. This is the substance known in the market as superphc lime. If no additional plaster or other substance is mixed with it, it is a ble manurial substance. Could the animal matter contained in the entir be separated from it before it is subjected to the action of the sulphuric ac be restored to the mixture afterward, a very powerful manure would be ob This is said to be done in the manufacture of the superphosphates in m But we have found so much difference in the sensible properties and in of different samples of it, that we conclude that the soap-maker at g share, even if the glue-maker is denied, or that the material used in facture consists of bones so long exposed to the action of the weather ani animal matter has been wasted out of them. When this article is man on a large scale for the trade the process is as follows:

Bones are collected from every possible source; boys and girls g in the streets of cities; butchers and provision dealers save them; the country with horses and wagons, picking up from house to ho pound or bushel they can get, while vessels collect them in ge q wherever they can be found, and find a profit in the business. bone in a raw condition, not having been used by soap-boilers, or in any ot lessen their value. When collected and thrown into heaps, under cover, bone is examined, and all such as are suitable to be used in the arts are laid aside for turners, cutters, and so forth, to be used for knobs, h knives, canes, and umbrellas, and the smaller pieces to be made into Such as are not fit to be used in the arts are thrown into iron retorts, eac ing two barrels. The covers of these retorts are fitted so exactly tha nearly or quite air-tight. When thus made ready they are let dow nace, where the whole mass, retort and bones, soon acquires a red at; air being admitted, no flame takes place in the bones. In this in the animal matters, the gelatine, oils, ammonia, &c., are driven form of steam pass through a pipe to a reservoir prepared for th in a part of the building. The pipe through which they pass, as in the distillation, is immersed in cold water, so that the oil and gelatine thickened state, and most highly charged with the pungent ammonia. experiment having taught the workmen how long to allow the r in the furnace, when that time has expired they are taken out and set wheelbarrows and placed away to be cooled off. The bones are to what is called bone-black or *animal charcoal*. This is ext refining sugar. They are of a shining black color, brittle, and

lly ground, not into flour, but into quite small particles. Two barrels ound bone is then placed in a wooden vat, and spread evenly over the Four gallons of the liquid that ran out of the retort are thrown upon e whole is thoroughly stirred. When the mass is sufficiently mixed, to sixty pounds of sulphuric acid are added and mingled. A powerful or boiling takes place, which continues several minutes, during which workmen keep the whole mass in motion. When it subsides, the article ne what is called superphosphate of lime. It is then spread upon floors r in fine weather upon platforms made for the purpose in the open when partially dried is packed in barrels or bags, and is ready for the By this process nothing that the bones originally contained is lost, it has undergone important chemical changes.

be doubted then that superphosphate of lime, judiciously applied to d for it and needing it, will greatly promote the growth of many of our It is said, however, to be often adulterated with black loam or pulver-k, which so nearly resembles the burnt bone in color and texture that ult to detect the imposition without the aid of chemical tests.

are other modes of reducing bones so as to make their properties avail-he farmer. One of these is to mix one part of sulphuric acid with two ter, and immerse the bones in the mixture until they are softened into nd then mix them with dry muck or some other substance that will the adhesive particles and make them convenient for use.

er and a better way is to reduce them by steam, by the following pro-strong steam box is hung upon a frame so as to be easily turned over. hole is cut through one of the sides, and a cover tightly fitted to it, in place by clamps and a screw. The box is charged with bones this hole, the cover closed and the steam admitted. It requires a ted steam to break them down, which must be constantly applied for ontinuous hours. It is claimed that by this process all the animal and natters that enter into the composition of bones are saved. A portion of ine which is driven out from the bones is conducted away, allowed to n contact with dry muck, and then a certain quantity of the dissolved dded, making what is termed *ammoniated superphosphate of lime.*

he mass in the steam box is sufficiently cooked, the cover is removed, turned over, and the contents precipitated upon the floor; from the carried by machinery to a room above, that is heated by steam, and as it becomes sufficiently dry is moved along to a hopper, passes through d comes out in fine granular particles, which can be readily broken the thumb and finger. The first requisite in the use of superphosphate be absolutely pure. Numerous cases of failure that have been reported, oubtedly arisen from the shameful adulterations, either by the manu-r by those who have purchased to sell again. In some instances, failures may be traced to total misapplication, as when it is applied to ompletely charged with cold water that they are rarely warmed to a induce fermentation and the other processes of decay; or, again, when ed to dry gravelly soil entirely deficient of humus. Superphosphate ally adapted to all plants. On all the Brassica family, including the Swedish turnip, common flat turnip, cauliflower, broccoli, &c., its influ-sually striking and profitable. The leaves of the plants grow larger er and assume a darker green than we have ever seen them under the of any other fertilizer. It is also useful to beets, mangolds, peas and d all other of the field and garden crops.

l years since we made an experiment with it on a young pear orchard g one hundred and fifty trees. It was applied at the rate of six hun-ds to the acre, and sowed broadcast in November. The land was a m, had been moderately manured for several years in succession, but

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heavily cropped each year with carrots, parsnips, grapes, and raspberries. In the spring succeeding the dressing with superphosphate, the carrots and parsnips were omitted, and white beans and grapes were planted. All the crops were almost extravagantly luxuriant during the summer. The change in the size and color of the leaves of the pear trees was remarkable, and afforded a striking contrast between themselves and the leaves of other pear trees but a short distance from them. The fruit in the autumn was of corresponding excellence. The beans planted were the white pea bean, which usually grows about a foot high; they also felt the power of the fertilizer, and instead of modestly keeping near the ground, as is their habit, made an average growth of three feet, some of them climbing into the branches of the pear trees, six from the ground. The young grape vines also made a rapid growth, as did stools of raspberries. The same spot has been annually dressed in Novei with farm compost, moderately, and spaded in. The pear trees are ten feet each way. Between them in the rows is a grape vine and two stools of Brinkle orange raspberries, and beans planted between the rows of pear trees. With such management the crops, crowded as these are, continue at the close of six years to be as luxuriant as ever. During the last autumn the pear trees required propping to enable them to sustain their load of fruit, and the grapes trained to stakes broke their accustomed fastenings and fell to the ground. The l yielded annually at the rate of about forty bushels to the acre.

We have thus stated somewhat in detail what phosphate of lime is, how it is produced, what crops it is best adapted to, and something of its power upon crops when properly used—so that the farmer, unaccustomed to its use, i avail himself of its advantages without the risk of loss.

SALTPETRE.

Nitric acid with potash, soda, ammonia, and lime, forms salts, which go by the general name of saltpetres. The nitrates of potash and soda are best l ra to us. The former is imported largely from the East Indies; the latter coi to this country mostly from Peru, where it is found in extensive beds combi with earths, from which it is extracted by a rude process of lixiviation and evaporation.

From some experiments which we have made with saltpetre, we are inclined to think that its value as a manure is not fully appreciated. In those experiments, at a cost of five cents a pound, we found it among the cheapest manures we had ever used. Its use is not a modern discovery. The first Eng author who wrote upon husbandry, in 1532, Anthony Fitzherbert, describes it as having the power to insure the farmer the most abundant crops. A hi years after, Evelyn told the farmers of his age if they could obtain a ple supply of saltpetre they would need but little other compost to meliorate u ground. Even Jethro Tull, who zealously denied the necessity of ma of any kind, placed nitre at the head of his list of those substances which deemed to be the essential food of plants. But it is only in modern days saltpetre has been extensively used as a fertilizer, for it is not long that it been produced in quantities sufficiently reasonable to enable the farmer to it profitably as a manure. It is so extensively used in the arts, espec the manufacture of gunpowder, that the price has been thought too l i make it a profitable investment in the soil. In large quantities, however, and in ordinary times, we think it may be obtained at as low prices as Peruv guano or the superphosphate of lime.

Experiments are not wanting to show the results of the use of saltpetre upon crops, and this is the point of interest to us. A gentleman used it in the kitchen and flower garden, where it increased the beauty and prolonged the bloom of the flowers · and, at the rate of two hundred pounds per acre, on a crop of horse-

ıh, with the most beneficial results. It prevented mildew on early peas and fruit trees. Its application to red clover greatly increased the crop.

ın England it is supposed that the most effective method of enriching land is ling sheep upon it, and yet a gentleman in Hertfordshire produced with ıundred pounds of saltpetre to the acre, eeffects more than equal to those ›uced by folding sheep. Another gentleman states that on the sandy lands Surry, with one hundred pounds of nitre on clover, he produced results fully ıal to those of twenty-five cubic yards of horse dung. Still another, by the ı of one hundred pounds to an acre of light land, obtained an increase of six d a half bushels of wheat. In a report of the Hardstone Farmers' Club, it ted to be the unanimous opinion of the meeting that saltpetre was excel- ın its effects on heavy clover lays, and that on light lands it was highly ficial to wheat, clover, and other lays, and tares. A farmer in Essex ', England, got forty-four bushels of barley, without saltpetre, on an acre, with a top dressing of one hundred pounds got fifty-four bushels.

Several years since, when the potato rot passed over the land as a scourge, he prospect seemed to be that this most valuable esculent was to be blotted rom the rich list of table vegetables, we instituted some experiments with e which afforded the most gratifying results. We ploughed a portion of grass field, harrowed it into a fine tilth, and sowed two hundred pounds gypsum, and mingled with it one pound of saltpetre to the square rod, or ıdred and sixty pounds to the acre. The saltpetre was pulverized as r as could well be done with the crude means at hand for such a purpose. crop was hoed twice and all weeds kept down. The potatoes planted were ıe white Chenango variety, and yielded one hundred and fifty bushels per re. They were very smooth and fair, and not a peck of rotten ones was d where the plaster and saltpetre was applied. On a part of the field which received no special fertilizers, the potatoes were fair, but *rotted so rapidly, emitted so foul an odor, that a part was dug and buried in the field out of*

ıne remark that we made respecting guano is also true of saltpetre, and in of all other manures, viz: that if they are made fine, and applied in wet ist weather, their effects will be more immediately apparent.

POUDRETTES.

poudrettes consist of blood, fish and animal matters, and night-soil, dried bined with substances capable of deodorizing them and absorbing their phosphuretted hydrogen, and other gases and moisture, and reduced pov . A species of poudrette, called fish manure, is now prepared by and pressing the fish, chiefly menhaden, for the purpose primarily of ıng their oil. These fish are taken in nets in large quantities at certain sea- They are steamed and subjected to strong pressure, by which the oil is out, and the residuum is left almost as dry as so much seasoned wood. It is ground and packed in barrels for the market. All the poudrettes are packed or bags, and can be readily transported by land or water. In some the entire fish, fresh from the ocean, are used for carrying a crop of by depositing one or two in a hill, drawing a little soil over them, and the corn upon it. Fish are extensively and profitably used by the on Long Island and in many places on the coast of New England. On eake bay, in Maryland, the farmers collect large quantities of fish offal art them many miles inland, and also from the fisheries on the Potomac, ra and other rivers.

ly manufactured the poudrettes are very valuable manures. to the roots of plants, in a soil well supplied with coarser ma- r give a vigorous start to young plants, and a larger development

and a deeper tint to the petals of flowers. When applied in the hill they to the young corn a fine and early growth. They are rapidly decomp the soil, and should always be so deeply covered that their evolving gases be retained by it. They should be sprinkled over a surface of ten or tw inches square, rather than thrown in a mass around the seeds or roots of y plants. If the soil is cold, or the season backward, their good effects immediately manifest. The poudrettes have been suggested as a means of improving the culture of the cotton plant, and as they are easy of transporta tion and application, it is desirable that they should be fairly tried, and the present seems to be a favorable time for trying them. On light soils, or on soils partially exhausted, they must prove a powerful stimulant to the growing plants. They would seem to be well suited to the sandy soils of the sea islands on the coast of South Carolina and Georgia. Three or four hundred pounds to the acre will probably be sufficient to insure a large crop. In the warm climates in which cotton is grown, cattle are not fed in the barn; stable composts are, therefore, not to be had. Composts made of beans, weeds, and other vegetables, with lime, ashes and salt, and guano and poudrettes, seem to be the only ma- nures within the reach of the planters. At the present time, when labor is so difficult to be obtained, and cotton is in such demand, we would earnestly that experiments should be made with some or, all of these substances. cake, made by expressing the oil from the cotton seed, may be found an e lent fertilizer for the plant. If by these means a larger crop can be made the acre, labor will be saved, and the profit from its culture will be incre With the introduction of improved farm implements, improved methods of ture should also be introduced, that the losses of past years may be the more speedily recovered.

We would suggest the following method of applying poudrette or guano in cotton culture as one that is both cheap and easy: Plough furrows at s distances from each other as it is desired that the cotton should grow; spri the fertilizer in these furrows; then cover it by turning a light furrow on to from each side, which will form a ridge; now pass a light roller, long eno to take two at a time, lengthwise of the ridges; plant the seed upon the ridges with a seed sower or by hand, and cultivate in the usual way. By this met the tender germs of the seed will not be brought into immediate contact with the fertilizer; and in the case of guano and ashes this is a matter of much im- portance. By the time the radicles reach the manure thus buried, they will have become sufficiently firm to resist any caustic action they might exert, be able to appropriate the stimulating nutriment they afford, and will t a vigorous and luxuriant growth.

THE APPLICATION OF MANURES.

We have already said so much upon the application of manures, while treating upon their composition and preparation, that the reader will very naturally ex- pect, and probably hope, that we shall very briefly dispose of this part of subject; but it is a matter of no small importance, and the progressive fa will be willing to give it a careful consideration. Before discussing more par ticularly, however, the application of manures, we will institute an inquiry the effects produced by manures upon growing plants and upon the soil.

Were the theory correct, advanced by Jethro Tull and others, that plants derive all their nutriment from the atmosphere, the application of manures to the soil would be of no benefit to them, unless it were to stimulate them to drink up the carbonic acid and the hydrogen, and, in some cases, the nitrogen of the atmosphere, more eagerly. But experience everywhere teaches us that the liberal application of manures causes vegetables to grow with more vigor and to attain a much more perfect development. The obvious inference f

is, that manures furnish to plants the elements of nutrition, which they
ly consume and appropriate to their growth. Vegetables, like animals,
ss the wonderful, almost creative, power of assimilation; they can transfer
s of inorganic matter to their own organs, and imbue them with the life
exists in those organs. Let us illustrate this by reference to the process
stion in animals, where it can be more readily traced. The food is
ed into the stomach, where it undergoes a sort of solution, and is then
d forward into the intestines, where it is presented to the mouths of
ds of little vessels, which drink up the fluid portion and convey it to larger
ls, by which it is conveyed to the heart. By the heart it is sent into the
, where it is acted upon by the air in the lung cells, and is then returned
heart, and by means of the arteries sent to the various tissue-forming ves-
hroughout the body. The blood in the arteries is apparently a homoge-
fluid, but is in fact a very compound fluid, containing in solution various
nts that previously existed in the food. The tissue-forming or assimilating
ls are endowed with the power of selecting from the compound mass pre-
d to them, such elements as they need for their respective purposes, and
the remainder. From the materials selected they build their several
s and repair the waste that is constantly going on in them. Thus one
vessels forms bone, another muscular fibre, another skin, another hair, &c.
vessels, from the same circulating fluid, eliminate the various fluids con-
l in the body, as serum, milk, urine, &c. There is a system in many re-
s similar in the lower grade of organized beings which we term vegetables.
are drunk up by the hair-like radicles by which their roots are covered,
nveyed upward in vessels arranged for this special purpose, and when
have passed through the stem or trunk, they are distributed to the leaves.
fluid passing from the spongioles to the leaves is called the ascending sap.
e leaf the sap is acted upon by the elements contained in the atmosphere;
n becomes the descending sap, and is presented to the various tissue-form-
essels in all parts of vegetables. It is now apparently homogeneous, but,
th, exceedingly compound, containing the various bodies in solution which
drunk up by the radicles, and which have been absorbed from the atmo-
e in the leaves. The vessels of vegetables have the same seemingly intel-
power of selection that exists in the vessels of animals. They are thus
ed to select from the compound circulating sap, what each set of vessels
es to construct the tissue which each has in charge. One set selects ma-
for the albumen, another for the leaf and leaf-bud, another forms the fruit-
nd ultimately builds up the fruit. One set constructs the woody fibre,
er the starch, another the gum, another the resin, another set the bitter
ple, another the sweet juices, and still another the poisonous elements.
set forms the sap that blushes or glows in the petals of the flowers;
er selects, atom by atom, the lime that enters into the composition of the
of wheat; another set weaves the covering for this same grain from the
y fibre; another deposits the fatty elements and arranges them in layers
d the starch, and sugar, and lime, of which the kernel of corn is built up.
h tissue and each product of vegetable life is formed, by innumerable
rrom the descending sap.

is sap, then, must contain all the elements required to form all the various
ble tissues, and for their rapid and perfect development the supply must
undant, and must be in due proportion, and must be furnished at the time
it is required by the formative vessels. An animal fed upon starch alone,
n sugar alone, will soon starve and die; the various vessels cannot ob-
he materials necessary to carry on their work; so, if a plant is furnished
y one element of nutrition, be it ever so abundant, it will cease to thrive,
only those vessels that require this element will carry on their proper
r example: certain vegetables supplied with an abundance of nitro-

genous manure will produce an exuberant growth of woody fibre, of stalk, of leaf, and but little or no fruit or seed.

We are now prepared to understand somewhat more clearly the effects of manures upon vegetable growth.

Manures furnish to the sap vessels the various elements which they nee the construction of the different tissues, in such a state of minute subdiv that they can take up, atom by atom, what each requires. All the el existing in the soil furnish their respective quotas to the compound sub constituting the sap. Some of these elements are capable of solution in the soil; others are incapable of direct solution, and without the presence of some other element capable of either acting upon them, and thus rendering them soluble, or of combining with the solvent and imparting to it a higher power of solution, they would remain inert in the soil. Thus silex is insoluble in si water, but the presence of lime or potash in the solvent gives rise to a action, and silicate of lime or potash is formed, which is soluble, and thu comes an ingredient in the sap. Silex is an important constituent in the dermis of several of the grasses and of the straw of grain. When such plants do not contain a sufficient supply of silex in their outward coats, they break down under their own weight, and lodge on the ground before they have att their full maturity. This we often witness in clover, and herd's-grass, a upon reclaimed meadows and swamps. In such cases a top dressing of sand or gravel will impart to the growing crop of the next season sufficient firmness to enable it to stand erect until its growth is completed. In such cases, even if lime and potash are not directly essential to the growth of plants, they tribute indirectly an important service—they render the silex soluble. This instance affords a beautiful illustration of the chemical action that is constantly going on in the soil.

Different soils require different treatment. Clay soils should be treated lime, ashes, and light composts; such as contain straw and partially decomposed vegetable matters keep such soils light, and furnish by their decomposition the humus in which they are deficient. Black, moist soils, that have been long cultivated, are generally exhausted of the lime and silex needed for and grain crops; hence composts containing sand are especially useful on s soils. Lime may be applied freely upon the surface of such soils in the of plaster, slaked lime, or superphosphate, with advantage. On light soils, well-worked composts, rendered as fine as possible, and containi proportion of muck or other carbonaceous substances, and animal manures of sorts, are peculiarly appropriate. The influence of animal manures upon soils is well illustrated by the luxuriant growth of corn and melons upon sands of Cape Cod, by means of fish offal and prepared fish manures. S soils are hungry for the elements which these manures contain. W manures are applied to such soils should be well covered in.

Should manures be deeply covered in the soil, or should they be ap near the surface, are questions about which cultivators differ. So much interest has this question excited, that some five years ago the Massac Agricultural Society offered premiums to induce farmers in different the State, to try experiments with manure placed at different depths soil. The plan was as follows: Five lots of the same size, on sin side by side, were to be selected, marked, and numbered. On numl one the manure was to be ploughed in deeply; on number two it was to be plo in four inches; on number three it was to be spread on the surface and rowed in; on number four it was to be spread on the surface and not in; on number five no manure was to be put. The lots were all to be and cultivated alike for three years in succession, without the addition of more manure, and the entire crop of each lot for each year weighed, count of the seasons, with a description of the soil, was to accompany

rt. The reports indicated that the best average results were obtained from acing the manure about four inches deep. The depth at which manures uld be covered will depend upon three circumstances: the nature of soil, the kind of manure, and the kind of crop. All manures should be ed at a sufficient depth in the soil to keep them moist, or they will be inive. When a soil is naturally heavy and moist, it is not necessary to bury re so deep to insure its being kept in a moist state, as when it is light and . Manures containing a large proportion of volatile elements should be ed more deeply. These elements, when the soil becomes warm, assume gaseous form, and tend to rise to the surface, and will be diffused through oil lying over them, and, if there are elements in the soil having an affinity them, will be retained. Other elements which are not volatile, as lime, s, and salt, but which are soluble in water, may be safely applied on or the surface, where they will be dissolved by the rain and sink into the

o : vegetables strike their roots deeply into the soil, and for their perfect elopment require a deep tilth. In such instances trenching or deep ploughs peculiarly beneficial. For such crops a portion of the manure should be ed deeply into the soil. In preparing a garden soil it is a good method ead on the surface a coating of manure, and plough or spade it in deeply, then to add a dressing of fine compost or liquid manure, and work it in n the harrow or rake. Thus the deep-growing plants will find nutriment at v stage of their growth. By a repetition of this process a deep, rich soil be formed, which will meet the wants of the various esculents of the en, and supply to each what its nature and habits require. For potatoes s not necessary to cover the manure so deeply, as they grow near the sure. The same is true of the flat turnip. The question has been often asked, w can manure be best applied for the corn crop? Shall it all be put upon soil before ploughing, and be ploughed in deeply? or shall a portion of it be aced in the hill or near the surface? When corn is to be grown on newly ed grass land, shall the manure be spread upon the grass and turned under sod? This is certainly the easiest mode of applying it, and many farmers rt that when it is applied in this way, although the corn may not be as rous in the early part of the season, yet in the latter part of it, when the is have struck through the rotting sod and found the manure deposited beth, it will grow with sufficient energy to make up for the time lost in the y part of the season. Others prefer to turn over the soil in the autumn, in the spring work in the manure upon the surface of the furrows with the row or the cultivator. In this way it is said the corn will get a fine start he early season, and when its roots strike into the mellow sod, they will find nourishment they require to complete the growth of the plant. Doubtboth these methods have been successful. If the season proves to be wet, the soil is naturally moist, the manure near the surface will give a good p, but if the season should prove dry, we may expect the best result from re deeply covered manure. The manure, fermenting under the sod, es it to become rapidly mellow and crumble into a fine tilth, and thus a n bed is furnished to the growing roots. But the largest crop of corn we ve ever seen, was produced by a combination of the two methods. Twoirds of the manure, sixteen ox-cart loads of rich stable manure to the acre, ere spread upon the sward in the spring, which was then turned over by the (1; the harrow was vigorously applied, and after this furrows were made rows with a light plough. Then the other third, eight loads, was put the furrows and the kernels dropped ten inches apart. This gave the n an early start, and it grew vigorously from the commencement, and its ots soon found the rich nutriment deposited below the sod. The crop in this se was one hundred and four bushels to the acre. As the corn crop is per-

haps the most important crop in the country—is, in fact, the national crop—the proper method of applying manure to it is a subject of great importance; but it is questionable whether any rule of universal application can be gi as different soils require different modes of application. In a heavy clayey soil it is important that the management should be such as to render the warm and light. To accomplish this object a large portion of the should be incorporated with the soil by the plough. Green manures do w on soils of this description, but as such soil, unless underdrained, is cold a does not set the crop forward early, something more is wanted. A quantity of well composted manure in the hill meets this deficiency. process is attended with labor and expense, but these are fully repaid by larger crop. Indeed, in such soils the crop is uncertain without the some such means, unless the season is peculiarly favorable. In light, warm soils the whole of the manure may be worked into the soil with safety, perhaps with more advantage to the soil, if the object is to prepare it for future crops. In any soil, if the chief purpose is to improve it and prepare it grass, grain, or other crops as speedily as possible, and the present crop of corn is a secondary object, the whole amount of barn manure should be thoroughly incorporated with the soil, and a little guano, poudrette, or superphosphate put into the hill to serve as a stimulus to the corn crop. In way, when the soil is cold and tenacious, a good corn crop may be se and the soil rapidly prepared for future use. The stimulant will be expen on the corn crop, and will contribute little or nothing to the permanen provement of the land.

For this we must depend wholly, so far as manures are concerned, upon and compost manures. When these are not used in sufficient quantity to e this object, artificial manures must be annually applied. But we think the corn crop is of sufficient importance to be considered a primary crop, and that the mode of applying the manure in all cases should be such as to insure a good crop, while, at the same time, the permanent improvement of the soil is secured. These objects are by no means incompatible, and may both be attained at the same time, and by the same process. In the culture of corn, manures should be liberally applied. There is less labor and less expense in raising sixty of corn on one acre than on two; and, in the former case, the land will be better condition than in the latter. One great necessity for applying manure the northern portions of our country is, that plants may be forced more y through all the stages of their growth, since, if left to themselves, the season is not long enough to bring them to perfection; and that system of culture w pushes them forward early, that they may get well rooted, and therefore be better able to endure the droughts that so often occur in July and Augu thus arrive at early maturity before the frosts of September, must be the best system. Could we add another month to the summer in this climate, we c cultivate many crops with a much less amount of stimulants than are required. Now we have to guard against the droughts of summer and the e frosts of autumn, and we do not esteem it safe practice to deposit the manure for the corn so deeply in the soil, that the growing crops cannot reach it till late in the season. When stable manure or compost, then, is ploughed in deeply, we would recommend the application of well-diluted guano, superphosphate, bone meal, or fine compost, in the hill. In this way, with a season at all favorable, the crop will seldom fail.

As a general rule, we would say that all compost should be well worked over in the early spring, before the weather becomes sufficiently warm to occasion a rapid development of the gases, and rendered as fine as possible. If the heap is too wet to work fine, a sufficient quantity of dry soil, peat, pulverized charcoal, or plaster should be added, to absorb the moisture and destroy the tenacity of the mass. All manures should be applied in as fine a state as is possible, with-

; too much exposure to the action of the atmosphere. If manures are reduced cool weather, when they are not in a state of actual fermentation, it may be without great loss of their gases. All manures that are to be applied to surface should be pulverized as finely as possible. Some plants spread their ts and seek their food near the surface, as the strawberry, and the whole y of the cucurbitaceæ. These, especially, require finely reduced manure. en manures are to be buried deeply in the soil, this mode of preparation is absolutely necessary. All manures, whether applied in a coarse or fine , should be immediately covered under the soil, that as much as possible of volatile elements may be absorbed by the soil. These elements, as we ve said, permeate the soil and divide its particles, and render them light and y traversed by the delicate radicles of plants. This mechanical effect is one s ll importance. A soil rendered light and porous by fermenting manure s ch better for this operation, as bread risen by yeast is better than a mass n.

It is the general practice of our farmers to apply manures but once in a season; certain manures may be applied more than once with much profit, provided y are applied during the growing stage of the plants, and in such a form as ningle at once with the soil, and become a constituent part of it. It must be er finely pulverized, or in a liquid state. In either form, it should be immeely worked into the soil around the plants with the hoe or rake. Many , including most of the small fruits, may be treated in this way with ex nt results. We have already seen that liquid manures may be applied veral times during the season to grasses, thus enabling us to take two or three or cuttings in a year. This is an important fact in soiling cattle, as it bles us to supply them with green and succulent food during the entire sum and autumn from the same ground.

Did we understand more perfectly the chemical constitution of the plants we vate, we might, doubtless, in many cases, supply to the soil the elements ially adapted to them; but such is the influence of the vital powers in difying the laws of organic chemistry, that we do not anticipate any important ts from the doctrine of specific manures considered by itself. Grapes propriate a large amount of potash. Asparagus, originally a marine plant, opriates marine salts. But we cannot depend upon lime and ashes to give uriant grapes, nor upon marine salts to give us large and succulent as . They both require, in addition to these substances, a generous supply the same elements of nutrition that other plants require. This subject is but rfectly understood. Theories may give us indications in this direction, but y will need to be corrected by much experimental research before they can us to any certain results.

Nature works out from a few simple elements, variously combined, the won al variety of products exhibited by vegetable life. If left to herself she ays obtains a supply of these elements; but when disturbed in her operations n, who removes from the soil its productions for his own use, instead of v them to decay where they grew, the soil becomes exhausted of necessary nts, and, unless they are returned to it in the form of manures, she soon s unable to complete the process which she commences, for want of mate . The plant is not perfect; its framework is not fully developed, or its seed not reach a perfect form, or does not arrive at maturity, because the needful nts are annually diminishing. The Fellahs, in Egypt, raise wheat a few s high, with heads not more than two inches long, upon soil that was once granary of the world. But Ishmael is teaching them a better style of farm by showing them upon his plantations wheat standing four feet high upon oil. In the older western States we are told that the wheat crops have hed from one-fourth to one-third in quantity per acre, and, unless the that have been removed from the soil are returned to it, the crops will

continue to diminish in a still more rapid ratio, until it ceases to be a rem tive crop. In eastern Virginia and Maryland, the soils that formerly yi thirty bushels of wheat now yield five or six, and are being deserted be their produce will not sustain their cultivators. Guano has been applied to soils; the nitrogen, and phosphates, and alkalies which it contains, render so certain elements still left in the soils, and one or two crops of ten or twer bushels have been obtained. But this process will soon cease, and the soil b left more completely exhausted than before. Portions of this exhausted soil a being treated in a different way by cultivators of market vegetables, who applying muck, stable manure, lime, leached ashes, green crops, and whaten will restore to the soil, in the most permanent form, the elements required b such vegetables. Hundreds of acres may now be found covered by thrifty of strawberries, gooseberries, currants, celery, radishes, turnips, beets, c melons, and similar crops, which a few years ago did not repay the labor o tivation. The favorable climate and convenient markets render such crops higu remunerative. The neighboring cities furnish the means of restoring to th the elements needed to sustain the large draught made upon it. The manures in this case is large, and for grain culture probably would not pay But it shows in a convincing manner what manures may accomplish. There i a vast amount of manurial substance produced in all cities, the largest which is annually wasted. If it could be carefully collected and judicio applied to the soils in their vicinity, their productiveness would be wond increased. But the transportation of manures to the soil to be cultivated is a expensive operation, and will prove economical only within certain limits, an for certain purposes. The true system of farming is undoubtedly to co upon the farm so much vegetable matter that the solid and liquid ani ex ment resulting, applied either simply or composted with other suitable su ces shall enable the farmer steadily to increase his crops, while, at the same his soil shall be as steadily growing richer and more productive. Every cultivated should be left in better condition after the crop is taken off, than was when it was put on. To attain this point, no more land should be cultiv than can be done without exhausting it. The good teamster will keep his or oxen at work steadily, without diminishing their flesh or strength. one who has had experience will affirm that it is the most profitable to keep team in high condition. The same is true of the soil. If the good teamster food for only two horses, he will not attempt to keep three. So the j farmer will cultivate no more acres than he can feed well. In most inst is better and more profitable, and attended with less expense and labor, to a large crop from one acre, than to raise the same amount from two. The so of the one acre is left in a better condition, and in a better state for any suc ceeding crop, than is the soil of the two acres.

We think that, in general, the farmers must rely upon their own farms their permanent supply of manures. Imported manures and artificial manure may be resorted to occasionally as temporary expedients; but unless the produc can be sold at a near market and at a high price, their use will not be foun economical in the long run. Although we think every farmer should rely his own farm, he may with propriety avail himself of such natural sources supply as his own neighborhood affords. The cultivator upon the sea-shore and ought to use the materials thrown at his feet by the waves. It would very unwise for him not to do so. Fish and fish offal are a resource of gr value to those within its reach. If combined with peat as a deodorizer du its putrefaction, it may be used without inconvenience. Marl-beds are so mines of wealth to cultivators in their neighborhoods. In the vicinity of works every one will be eager to avail himself of the leached ashes. Wo factories afford wool-waste and the washings of the wool, articles of great valu as fertilizers. Various manufacturing establishments, as glue-making, tanning

·making, &c., furnish waste materials that may be obtained by farmers in vicinity at a remunerative price. Every opportunity to obtain these and materials to add to the manure of the farm will be improved by the rising farmer.

ınere is one other means of reclaiming and fertilizing an exhausted soil, to ich we have barely alluded, that is worthy of more attention than it has eived in this country, especially on light, sandy soils, at a distance from the n or from extra sources of supply; we mean the ploughing in of green crops. a means of recuperating exhausted lands in sections of country where stable nures cannot be obtained, as old prairie lands or cotton fields, this must ultitely come to be a matter of the highest importance. Instead of leaving such ds to lie fallow, to recover by the slow processes of nature, and to be filled h the seeds of weeds, which it requires great labor to eradicate, buckwheat, ver, or other crops, ploughed into the soil, will become the means of rapidly ring their fertility. But this whole subject of green manuring has been ed so expansively by Mr. Wolfinger, in the last Report, that we will abstain its further discussion.

we have now spoken of the elements which enter into the composition of the pal manures in use, of the sources from which they are derived, and the ples which should guide us in their preparation and application. The ies of the several kinds which may be most profitably applied, must de- upon the circumstances of each case. The nature and condition of the the kind of crop, and the character of the manure, must all be taken into eration. When manures are carbonaceous, and not volatile, they may be ed in large quantities at a time, and their effects will be permanent. When consist largely of volatile elements it is a better rule to apply annually, ner, in such quantities as are needed for immediate effect. Such manures be depended on for the permanent improvement of soils, for their active ties are soon converted into gases and lost; their power is expended in growth of the present crop; hence they should be applied with reference to the present crop, and in such quantities as its wants require. The ty of any kind of manure must be determined by observation and expe- e; the judgment and skill of the farmer must be his guides in this matter. e is undoubtedly a disposition to cultivate too much land, to spread manure too large a surface. We do not yet understand the capacity of land. A keeper in Massachusetts kept fifteen horses, and spread all their manure acre and a half of land for several years in succession, and took off at ee crops seven and a half tons of good hay in a year, as much as he would got had the manure been spread on three or four acres.

preading manure over a large surface answered tolerably well when the soil new, and good crops were obtained for a time; but in this way many farms become exhausted. As the soil becomes exhausted of the fertilizing ele- s stored up in it, by repeated croppings, the injurious effects of this treatment more and more apparent. Men are slow to renounce the usages that ablished in former times and under different circumstances. They hesi- to give up allegiance to custom, in agriculture as in other things, and pursue ctices of ruinous tendency merely because they are sanctioned by authority. ded reformations are seldom inaugurated until they are compelled by neces- But many of our most intelligent cultivators have commenced the work reform; and when we shall all so cultivate our lands that they shall become fertile and more productive after every successive crop, we shall have the only true and economical method of applying manures.

CUTTING AND COOKING FOOD FOR ANIMALS.

BY E. W. STEWART, NORTH EVANS, NEW YORK.

A cursory survey of the business of agriculture will at once reveal th that the great effort of the farmer is to supply food for his animals, and i requires more food to supply the animals kept in the United States than t its whole population. It becomes, then, one of the most important inq how to economize this food so as to yield the greatest return. A saving o ten per centum would amount to millions of dollars annually.

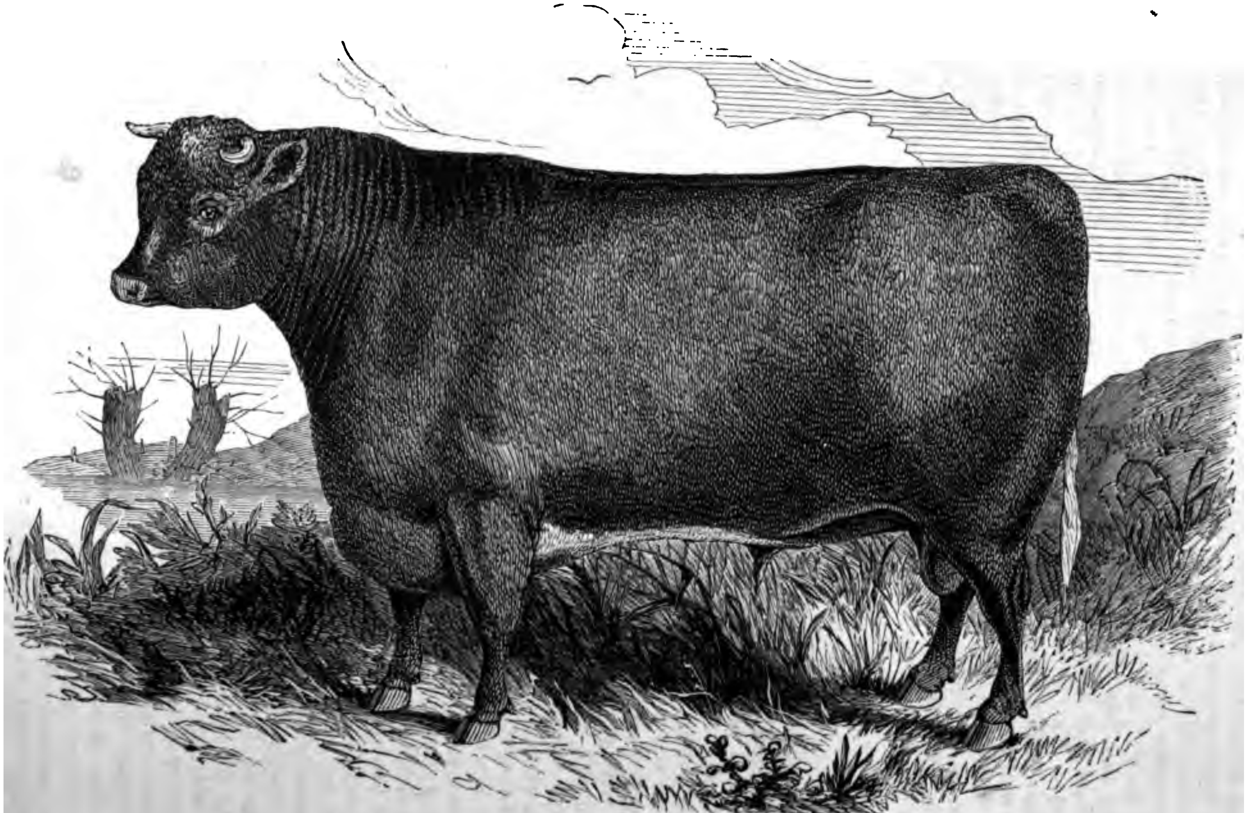
The discussion of the topics embraced in this article at State fairs, a individuals, shows that farmers are anxiously inquiring upon this subject. ful experiment is, no doubt, more satisfactory, and more convincing t practical farmer, than any theory, however plausible, and he generally v to know, first of all, what the facts are. If they are upon the right side, he little for the reasons upon which the facts are founded. But there is no also, that a clear theory, or the justification of a process, increases confide its utility. The writer must, therefore, beg the indulgence of the reader, he goes somewhat into the theory and reasons for cutting the dry fo animals.

Much has been said for and against this practice. One affirms that teet given to animals expressly to masticate their food, and that all attempts to or pulp it artificially, are impeachments of the wisdom of the Creator. same line of argument would abolish all shelter and care of animals by would return man himself to the savage state, and feed him on wild fruit nuts. Those who talk so reverently of nature, and fear so much to im upon her, forget that cattle in their wild state crop only green, succulent gr and do not dry and lay up a supply for winter use. As soon as the gra comes ripe and tough in the north, they migrate toward the south, where find green herbage. Thus it will be seen that man, in domesticating an and keeping them in a cold climate, changed their mode of living, substit dry for green food in winter, and that it thus becomes necessary to compe for this by assisting the animals in mastication. Man has produced fro wild crab-apple the splendid modern pippin; and from the lank wild bu cow, the magnificent proportions of the Durham and the rounded beauty Devon. This, too, has all been done in opposition to the natural habits o and animal, and man is quite likely to continue his efforts so long as rewarded by such splendid results.

WHY FODDER SHOULD BE CUT.

The object of mastication of food is to comminute it, to break down its ture, and to render it more easily acted upon by the gastric juice, thus en the animal to appropriate its nutriment. Now, the more finely divided fo when subjected to the gastric juice, the more rapidly and easily it is dig For when finely divided it presents many hundred times more surface action of the digesting fluid. This is simply represented in cooking fine or whole grain. We know it takes but a few minutes to cook the meal, hours are required to soften the whole grain.

PLATE XXI.



SHORT HORN BULL "GENERAL GRANT."

Vhen cattle eat succulent food, the fibre is easily broken and reduced to a py mass; but not so with dry, woody fibre, which must be broken and comıuted before the food contained in it is accessible for animal nutrition. This animal seldom does, and more especially the non-ruminating; therefore it :omes highly necessary that we should use machinery to assist the animal, much as possible, in extracting the nutriment contained in dry food. And t be profitable to cut hay, straw, and other coarse fodder, for the purpose of :aking the fibre, and rendering it more easy of mastication and digestion by : animal, then it is well to cut or divide it as finely as is consistent with econy. There is no danger of inventing machinery which will cut or pulverize too finely. The great want now is, a machine, cheap and durable, which ıll reduce woody fibre to pulp. This will require a machine which shall ıise as well as cut, so as to leave the whole fibre thoroughly mashed and rided. It will not be liable to the objection urged, that it will leave nothing the animal to do; for this dry fibre, when reduced to the greatest degree ticable, will still require more mastication than green grass. Our whole ɔrt in cutting and steaming is merely to produce an imitation of nature's green d.

MIXING DIFFERENT QUALITIES OF FOOD.

Here another advantage not to be overlooked is, that it enables the feeder to c different qualities of food together, making it all palatable, and thus saving . This is a matter of great importance, and alone would vastly more than all the expense of cutting. In this manner poor straw and good hay may mixed, coarse swale meadow hay with fine hay, corn stalks with hay, and ı or bean straw with hay, when the poorer qualities would not be eaten alone; if hay be scarce or of too high price, cut straw may be made equivalent to best hay, by mixing two quarts of fine middlings or bran, or one quart of n meal with a bushel of straw.

The writer of this paper has practiced cutting and steaming fodder, of all s, in winter, for a stock numbering from ten to fifty-five neat cattle and ses, during the last ten years. He therefore deems his experience sufficient enable him to speak with some degree of confidence. He tried a long series of ɔeriments to determine the quantity of middlings or meal necessary to mix with ushel of straw, to render it equivalent to the best hay. Ten animals of about m size, standing in the same stable, were parted—five being fed upon y, and five upon the mixture. At first four quarts of middlings were mixed :h a bushel of straw. The animals were fed for one month—five upon this xture, and five upon the hay. Those fed upon the mixture were found to lecidedly upon those fed upon the hay alone.

ı ne experiment was then reversed, putting those upon the mixture that had upon the hay, and *vice versa*. At the end of the month those fed upon ı straw and middlings had gained rapidly, while those fed upon the hay had :dly held their condition. Then the experiment was continued by reducing : quantity of middlings one-half, or to two quarts, on which mixture the mals did rather better than those upon hay, while, upon reversing, those at t fed upon the hay when fed upon this mixture did better than those on y. Upon several trials afterwards it was uniformly found that a bushel of ıw with two quarts of middlings was quite equal to the same weight of hay, and was worth 25 per cent. more than uncut hay. It was found that animals would eat 25 per cent. more hay uncut than cut. The same experiment was then tried with corn meal, and one and one-half pints were found ke a bushel of straw equal to hay, though the formula is generally given ı quart to a bushel of straw, which will render almost any quality of straw to the same weight of good timothy hay.

The writer has found for many years that he can winter his stock in better condition on straw and middlings, or meal, in the proportions given, than on hay. This is a large item near a good hay market, and where straw is worth but little, or in a grain country, where little else than straw is raised as fo for animals. In this way all the coarse fodder on the farm of every descripti may be consumed by animals, and thus turned into money. Where steami is practiced there is also a large profit. Besides, this enables the feeder to p pare a special food to produce such special results as he may desire. It is known that the intelligent feeder may increase the frame, or muscle, or fat an animal exclusively, or he may increase them all together. If he wishes increase the frame and muscle particularly, he will give food rich in phosph of lime and gluten, without having much oil or a large proportion of starc and for this purpose pea or bean meal, mixed with his coarse fodder, will duce the desired result. If he wishes to lay on fat principally, he will corn meal or oil meal. If to produce growth of the animal in frame muscle, as well as fat, let him mix the different kinds of food together. T he may produce such results as he pleases, and, at the same time, use w would otherwise be refuse and waste.

It is shown, by accurate observation, that hay, straw, or other coarse fod when well cut, is more uniformly digested by both neat cattle, horses, and sheep, than uncut. In England large feeders have estimated the gain in nutriment and saving of waste in hay to be equal to 25 per cent. Some experiments in this country have estimated the gain even higher, and certainly gain is more in cutting coarse fodder than on hay.

WHAT IS GAINED IN CUTTING FOR A SMALL STOCK.

An experiment will illustrate the profit of cutting. When keeping a s stock, which would consume thirty tons of hay in a winter, seven tons of ha were sold, and seven tons of middlings bought and used upon cut straw, (tr quarts upon a bushel,) and the stock wintered in fine condition. The was thus turned into twenty-three tons of hay, worth, that year, $18 per to in barn, or $405; (generally it is worth $12 per ton.) Hay, in most localitie is worth as much per ton as middlings, and half to three-fourths as m corn meal; therefore the avails of one-fourth the quantity of hay requisite winter a stock of animals will purchase the middlings or meal necessary to upon the straw, and the hay (or its value) be saved to the farmer. In from long practice, the economy of the straw cutter is as well established w the writer of this article as that of the mowing machine.

But it is sometimes said that it may pay on a small scale, and accor many small hand-machines are found by which farmers cut for a few cows, or a pair of horses, still feeding the principal part of their stock uncut food. In this idea the ordinary rule of manufacturers is reversed, viz: that what will pay upon a small scale will pay much better on a large scale. It costs more in proportion to make one wagon than one hundred; so it costs more in proportion to cut fodder for five animals than for fifty. To show that it pays on a large scale to cut hay, we have only to refer to the fact that the large omnibus lines and street railroad companies of our large cities cut all the hay and coarse fodder used for their hundreds of horses. These companies have learned, from practical experience, that the saving is many times the cost of cutting.

When cutting is done for a large stock with the largest size two-horse machine, it takes but little longer to cut a ton of hay than to handle it without cutting. Horse or steam power is much cheaper than hand power when more than a few animals are to be fed.

STRAW CUTTERS.

ch improvement has been made within a few years in the construction of cutters. It is of the highest importance in selecting a machine to get one cuts short and with perfect regularity; and to this end great attention be paid to the feed apparatus. Unless the hay or straw is delivered to nives with perfect regularity, the work will be badly done. The greatest of most machines is the defect in this part of the machinery. Some are by hand. These should be discarded, as there can in this way be no regu-y of cut. A short and regular cut secured, next in importance is strength, licity, and durability. The two machines that combine these requisites perfectly are the Cummings's patent, made at Fulton, New York, and the ire Cutter, made at Rochester, New York. The writer has used one of the for some six years, and he can say for it that it works as well as a ma- can which cuts without mashing the fibre. The perfection of this kind hine is yet to be invented which shall mash or pulp the fodder. The une first named cuts from one-eighth to six-eighths of an inch, but both well and with regularity.

COOKING FOOD FOR ANIMALS.

Steaming food is less practicable but even more important than cutting. Cook-d for animals is of comparatively recent date. A brief notice of its ra-le will demonstrate its importance, as well to animals as to man.

Pereira says: "To render starchy substances digestible, they require to be ed, in order to break or crack the grains; for of the different lamina of ich each grain consists, the outer ones are the most cohesive, and present the test resistance to the digestive power of the stomach, while the internal are least so." "Starch," says Raspail, "is not actually nutritive to man it has been boiled or cooked. The heat of the stomach is not sufficient to all the grains of the feculent mass which is subjected to the rapid action organ. The stomachs of graminiverous animals and birds seem to pos-in this respect, a particular power, for they use feculent substances in a state. Nevertheless, recent experiments prove the advantage that results boiling the potatoes and grain, and partially altered farina, which are given for food; for a large proportion, when given whole, in the raw state, s through the intestine perfectly unaffected as when swallowed." Bracon-found unbroken starch grains in the excrement of hot-blooded animals fed raw potatoes; hence he adds, "the potatoes employed for feeding cattle l be boiled, since, independently of the accidents which may arise from of them in a raw state, a considerable quantity of alimentary matter is by the use of these tubers in the unboiled state."

much for the effect of heat upon grain and roots; but it may be asked we can derive the same benefit from cooking hay, straw, and other fodder for stock. The following quotation from Regnault will show difference exists between them, the stems containing woody fibre as well cellulose, while roots and grains do not:

"A microscopic examination of the various component parts of plants shows all to be constituted of cellular tissue, varying in form according to the of the vegetable subjected to examination. The cavities of the tissue are d with very diversified matter; sometimes, as in the case of wood, the pa-of the cells are covered by a hard and brittle substance called *lignum*, or *dy fibre*, which frequently almost completely fills their interstices; while, r th s, as in the grains of the cerealia, potatoes and other tubers, the c in a quantity of small ovoidal globules, varying in size, constituting

fecula or *starch;* and lastly, in the case of the young organs of plants, the cells contain only a more or less viscous fluid, holding in solution mineral salts and various organic substances, the principal of which are gums, gelatinous combinations, designated by the general name of *albuminous substances*." We conclude, then, that if heat aids in rendering the nutritive principles of roots and grains more accessible to the assimilating faculty, it will also assist in softening the fibre of hay and straw. The cell walls which imprison the alimentary substances mentioned, will, by the joint processes of cutting and steaming, be more or less broken and weakened.

The following extract from Johnston's Agricultural Chemistry shows the further effect of heat upon starch itself:

"When wheat flour, potato, or arrow root starch is spread upon a tray and gradually heated in an oven to a temperature not exceeding 300° F., it slowly changes, acquires a yellow or brownish tint, according to the temperature employed, and becomes entirely soluble in cold water. It is changed into dextrine gum. * * * During the baking of bread this conversion of starch into gum takes place to a considerable extent. Thus Vogel found that flour which contained no gum, gave, when baked, a bread of which 18 per cent., or nearly one-fifth of the whole weight, consisted of gum. Thus one result of baking is to render the flour starch more soluble, and therefore more easily digested." Of starch he says: "It is a property of starch of all kinds to be insoluble in cold water, but to dissolve readily in boiling water, and to thicken into a jelly or paste as it cools." It is supposed that, by digestion, starch becomes converted into gum or sugar, and the latter probably becomes absorbed. It is also an element of respiration, and, according to Liebig, contributes to the formation of fat in animals. His theory is, no doubt, well founded, and explains the fattening of animals when fed upon Indian corn.

VALUE OF STRAW, ANALYSES, ETC.

Few farmers are aware of the value of straw. By the present system of feeding in this country little or no account is made of it. It serves mostly as litter for animals. Let us examine the general analysis of straw, as compared with the forage crops and grains. The following table is from the Cyclopædia of Agriculture:

Average composition of wheat straw.

Dried at 212° Fahrenheit, 100 parts contains nitrogenous substances, or—

Muscle-producing substances	2.[illegible]
Heat-producing substances	3[illegible]
Woody fibre	5[illegible]
Mineral substances	6.0[illegible]
	100.00

Corn fodder and bean straw.

	(J. H. Salesbury.) Corn fodder.	(Prof. W[illegible]) Bean str[illegible]
Flesh-forming matters	8.200	16.3[illegible]
Heat and fat-producing matters	35.273	33.8[illegible]
Woody fibre	50.251	25.84
Mineral matters	......	9.45
Water	6.276	14.47
	100.000	100.00

Cultivated grasses, average, dried at 212° Fahrenheit.

	(Prof. Way.)
ng nciples	10.34
nciples	2.51
ucing principles	41.29
re	37.18
tters or ash	8.68
	100.00

Indian corn and wheat bran.

	(Salesbury.) Indian corn.	Wheat bran.
ning principles	15.192	18.00
ucing principles	78.866	63.00
ng principles	5.945	6.00
	....	13.00
	100.000	100.00

Oats and rye.

	(Emmons.) Oats.	(Johnson.) Rye.
ning principles	18.447	16.00
ucing principles	73.376	69.00
cing principles	8.179	....
osphates	....	3.06
	....	11.04
	100.002	99.10

Barley.

	(Johnson.)
ning principles	6.1
fat-producing principles	69.3
	13.8
	10.8
	100.00

Beans and peas.

	Peas.	Beans.
	8.3	7 0
albumen, &c	26.4	23.6
	43.6	43.0
	2.0	0.2
	4.0	1.5
t	1.2	0.7
loss	2.0	1 0
	12.5	23.0
	100.00	100.00

The analysis of wheat straw, cornstalks, and bean straw will show at once the large amount of nutritive matter they contain, besides that denominated wood fibre. Bean straw and wheat bran, it will be seen, are very rich in nitrogenous matter, and therefore will build up the muscular system of the animal. From long experience we have found wheat bran to be equal, practically, to the analysis. If steamed, we regard it as valuable, per weight, as corn meal. Its analysis indicates that it has more muscle-forming matter than corn. This will indicate the important use that farmers should make of bran, when it is to be had for the price of hay, in feeding cows and young animals. An examination of these analyses will show readily how to mix a proper food to build up all parts of the animal system.

STEAM APPARATUS.

It will now be in order to give the reader a detailed account of the manner of conducting this cooking process. A perfect steam apparatus is yet to be invented. Many methods are used. The writer will describe the one he uses, and also a simpler and cheaper one for a small stock.

The one he has now in use consists of a wrought-iron cylinder, one-eighth inch thick, thirty inches in diameter, four feet long, with one-quarter inch iron heads. The front end has an elliptical opening, by which to draw off the water and clean it out, secured, when in use, by an iron stopper with rubber packing. On the top is another like opening, through which to fill it with water, and secured in like manner. An iron pipe, one and a half inch in diameter, is fastened to the top of the boiler, passes over the side of the brick-work, and down to the bottom of the steam box, where it enters the side near the centre. This boiler is set in brick-work, in a horizontal position. It is raised about sixteen inches above the first bed or grate. The fire is conducted under the length of the boiler, and partly up the back end; then carried along each side to near the front end in a flue, and carried back to the chimney in another flue above this. This leaves the front end of the boiler exposed, in which there is a cock from which to draw hot water if wanted. My steam box is made of matched pine plank, one and a quarter inch thick. It is four and a half by five feet, and three feet deep, holding over fifty bushels of feed. It might be larger if the stock required it, as my boiler generates steam enough for 150 bushels. The box is closed with a wooden cover.

PREPARING FOOD FOR STEAMING.

The feed is prepared for steaming thus: The cut straw, hay and straw, or other cut feed, sufficient to fill the steam box, is measured in a square six-bushel basket. It is then moistened by a four-gallon watering pot, with twenty gallons of water to fifty bushels of feed, while it is being stirred up with a fork. Then two quarts of wheat bran to the bushel of straw is mixed in the same manner, and a little salt added, when it is put into the steam box and steamed for an hour and a half. This feed will keep warm for two days in the coldest weather.

The reader will readily see the defect in this arrangement, as, with such a steam box, no considerable pressure can be obtained; hence it does not reduce the feed to such a pulp as is desirable. Yet it modifies and softens it very much. My boiler would safely bear a pressure of thirty pounds to the inch, and, with an iron steam box, the feed could as cheaply be put under that pressure and reduced to such a pulp as is desirable, as it now is steamed in the wooden box. When iron-work shall be reduced to the price charged before the war, an apparatus with iron boiler and iron steam box, will be within the easy expenditure of every considerable cattle feeder, costing not over one hundred and fifty dollars. This amount would be more than made up by its use for a single year.

CHEAP STEAMER.

rill next give a description of a very simple apparatus, which is within of every farmer. It is described, without the improvement which De made to it, in the transactions of the American Institute for 1863. sheet of No. 18 iron, (No. 16 would be better,) 32 to 36 inches wide, en or eight feet long (or two sheets may be riveted together, and thus fourteen feet long, if much work is to be done.) Take 2-inch pine maple would be better,) about two feet wide; let the sides extend three st the end plank; make a box a little flaring at the top and wide and ı, so that the bottom sheet will cover and project half an inch on le and end. Let the ends into the sides ½ to ⅜-inch in making the box, it together with white lead and oil, and put two ⅜-inch iron rods through s at each end, outside of the end plank; then nail on the bottom sheet with 's of five-penny nails, the nails about one inch apart in the rows, and joints, and bend up the sheet where it projects." This will hold some ls. "Now take flat stones or bricks, and make a fireplace the it your box, and eight inches narrower on the inside than your box is t outside." Fire bed should be 16 or 18 inches deep. "Put across ı a flat bar of iron ½ by 1½-inch, so as to lay a row of bricks on these s of the box to rest on, and at the back end let the arch run out so ıa a small chimney, and put on some joints of stove-pipe, and you have ıg apparatus." This is a good boiling arrangement, where only water thin liquid is to be heated; but if hay or straw, or even potatoes, are to d with little water, as would be the case, especially in steaming fodder, l settle and burn on the bottom. We have many times tried this in a ttle, with this result. This difficulty can be obviated entirely, and a aming apparatus be made of it by placing a false bottom one inch above bottom. This may be done in the following manner: Take a sheet of iron, of the size of the box, or, perhaps, one-half inch wider; have this l with small holes, so as to let the water down and the steam up. It et into the side of the box, or a half inch cleat can be nailed on the side of the box for it to rest on. This would not sufficiently support the of feed to put on it, and, therefore, ⅜-inch rods must be put through the ıder this false bottom, to sustain it—one, perhaps, every foot. Then a or iron faucet must be put through the side between these bottoms, to off the water. Now a wooden cover on the top of the box to keep the ı, and here is as complete, effectual, and cheap a steamer for cooking pressure, as can be desired. The whole apparatus would not, probably, er $25, for the seven feet, or $50 for the fourteen feet length. This ize would be ample for fifty to seventy-five head of cattle and horses mney should be as long as the steam box, to make a proper draft.

is, also, D. R. Prindle's agricultural caldron and steamer, a portable ıs used for boiling and steaming. It has been used in various parts of ıtry and highly spoken of for its convenience in being adapted to cook-ck, as well as for most other heating purposes on the farm.

ARRANGEMENT FOR A LARGE STOCK.

ıe benefit of those who wish to feed a large stock, one to two hundred cattle, or more, we will suggest an arrangement which will save much onomize the material, and produce more uniform results.

table steam engine of five horse power provided, we will arrange the steam box, food, &c., as follows:

tables are in the lower story, on each side of a feeding floor ten feet wide. be more convenient to have room behind each tier of animals to pass

a cart or wagon to carry off the manure, than to throw it out at the side. A wooden track should be laid in the centre of the feeding floor on which to run the steam boxes. Two, holding 100 bushels each, should be provided for 100 cattle. One would be run under the upper floor to be filled and steamed, and then moved away for use; while the other could be run to the spot, filled and steamed. On the upper floor the straw cutter would be placed, provided with a feeding apron to feed itself, with two bins overhead, one for cut hay or straw, the other for meal or bran. Elevators to carry up the cut feed from the straw cutter to the feed bin, as fast as cut, would be necessary.

There would also be necessary a water pipe connected with an elevated reservoir, to furnish water to moisten the feed. A tank might be placed overhead and filled by a force pump. Then, in a scuttle through the floor, directly over the steam box, there will be placed a cask or cylinder, three feet in diameter and five feet long, without a bottom, but a bar across the lower end, on which an upright revolving shaft will be set in the centre, provided with six arms, just long enough to turn inside. This shaft will pass through a like cross-bar on the top, and extending above enough to receive a pully of the proper size to revolve it some six hundred times per minute. Now a spout will extend from the elevated feed-bin to the top of this cylinder, with a slide to open or shut it; also a spout extending from the meal or bran bin, so as to communicate in the same way with the cylinder, and a water-pipe, also, furnished with stop-cock and movable cover, will be placed on top of the cylinder. A belt will run from the engine to the pully on the top of this shaft. Now, when ready to fill the steam box, this shaft will be set in motion—the spout for cut feed will be opened so as to discharge a definite quantity, the spout for meal opened to discharge the proportion desired, and the water, so as to let in twenty gallons for fifty bushels of feed. It will be seen that the feed, and meal, and water, in passing through the cylinder, will come in contact with these swift moving arms on the shaft, and be thoroughly mixed, and fall into the steam box, ready for steaming. The feed should be pressed into the steam box, as more will be steamed and better. With this arrangement, one expert man may cut and steam feed for one hundred head of cattle, and two men could easily care for two hundred. It will be seen that, with proper system and machinery, the expense of cutting and steaming for a large stock will be little more than in the ordinary way of feeding. This steam engine may be used to grind the grain, cut and steam the feed, and do all the work requiring stationary power on the farm. The engine should be placed as near the steam box and straw cutter as it can be with safety. A double spark extinguisher must be placed over the chimney, to prevent fire.

RESULTS OF COOKING.

It now remains for us to give the results of cooking by the method detailed.

First. It renders mouldy hay, straw, and cornstalks, perfectly sweet and palatable. Animals seem to relish straw taken from a stack which has been wet and badly damaged for ordinary use; and even in any condition, except "dry rot," steaming will restore its sweetness. When keeping a large stock we have often purchased stacks of straw which would have been worthless for feeding in the ordinary way, and have been able to detect no difference, after steaming, in the smell or the relish with which it was eaten.

Second. It diffuses the odor of the bran, corn meal, oil meal, carrots, or whatever is mixed with the feed, through the whole mass; and thus it may cheaply be flavored to suit the animal.

Third. It softens the tough fibre of the dry cornstalk, rye straw, and other hard material, rendering it almost like green succulent food, and easily masticated and digested by the animal.

Fourth. It renders beans and peas agreeable food to horses, as well as other

mals, and thus enables the feeder to combine more nitrogenous food in the t of his animals.

Fifth. It enables the feeder to turn everything raised into food for his stock, hout lessening the value of his manure. Indeed, the manure made from amed food decomposes more readily, and is therefore more valuable than en used in a fresh state. Manure made from steamed food is always ready e, and is regarded by those who have used it as much more valuable, for ss bulk, than that made from uncooked food.

th. We have found it to cure incipient heaves in horses, and horses having gh for several months at pasture have been cured in two weeks on steamed It has a remarkable effect upon horses with a sudden cold, and in con- on. Horses fed upon it seem much less liable to disease; in fact, in this ct, it seems to have all the good qualities of grass, the natural food of ls.

h. It produces a marked difference in the appearance of the animal, at causing the coat to become smooth and of a brighter color—regulates the on, makes the animal more contented and satisfied, enables fattening stock their food with less labor, (and consequently requires less to keep up the heat,) gives working animals time to eat all that is necessary for them ne intervals of labor; and this is of much importance, especially with horses. also enables the feeder to fatten animals in one-third less time.

Eighth. It saves at least one-third of the food. We have found two bushels cut and cooked hay to satisfy cows as well as three bushels of uncooked hay, the manure in the case of the uncooked hay contained much more fibrous unutilized by the animal. This is more particularly the case with horses.

nese have been the general results of our practice, and, we presume, do not ly differ from those of others who have given cooked food a fair trial.

OPINIONS OF AMERICAN AND ENGLISH FARMERS.

George A. Moore, at the New York State Fair discussion, 1864, says: "I eeding sheep and cutting for them timothy hay, millet, carrots, and feeding bean and oat meal. Before steaming, I found, by weighing, I was putting wo pounds of flesh per week. After steaming, I put on three pounds per k, and the stock eat the food cleaner, and I noticed they laid down quietly feeding. I also experimented with sixty-four cows. Used one of Prin- s steamers; had a quantity of musty hay which I cut and steamed. They l eat it entirely up, and seemed better satisfied with it than the sweetest steamed hay. Steamed food does not constipate the animal, the hair looks tter. I think cutting and steaming combined insure a gain to the feeder of least thirty-three per cent. The manure resulting from feeding steamed food worth double that from feeding in the ordinary way. Have kept eighty head stock, and had a surplus of food, on a farm where, previously, only fifty were through, and hay bought at that. After cows come in, steamed food the milk one-third, and the cows do better when put out to grass."

George Geddes, in the same discussion, says: "I find if I take ten bushels meal and wet it in cold water, and feed twenty-five hogs with it, that they it well; but if I take the same and cook it, it will take the same number hogs twice as long to eat it up, and I think they fatten quite as fast in the length of time. By cooking you double the bulk."

A. B. Conger, ex-president of New York Agricultural Society, said at same sion: "But steaming alone is not sufficient in the preparation of the food. must be first wet, so that if left alone ten hours it will heat. Water in large ortion must be added to the hay or straw after cutting. And so prepared steamed, thirty head of stock may be kept on the same amount of food as y on unprepared food. The mistake made in the early experiments in

this country and England was, that the food was not sufficiently wet befo steaming."

Professor Mapes says, Transactions American Institute, 1854, page 373 "Raw food is not in condition to be appropriated to the tissues of animal lif The experiment, often tried, has proved that eighteen or nineteen pounds o cooked corn is equal to fifty pounds of raw corn for hog feed. Mr. Maso of New Jersey, found that pork fed with raw grain cost twelve and a half cent a pound, and that from cooked food four and a half cents. Cooked cornstalk are as soft and almost as nutritious as green stalks. Cooking is an improve ment that pays. Cattle can be fattened at about half the expense upon cooked food, in a warm stable, that others can out doors upon raw food."

S. H. Clay, of Kentucky, says: "Fed two hogs on uncooked corn in thirty days 405 pounds, and they gained 42 pounds; while two hogs fed on cooked corn meal for thirty days ate 270 pounds, and gained 80 pounds. The food was then reversed, and the two hogs that had previously had dry corn, were fed on cooked meal. In twenty-six days the two hogs that were fed on dry food ate 364 pounds of shelled corn, and gained 44 pounds; while the two hogs fed on cooked meal ate, during the same time, only 234 pounds, and gained 74 pounds." Here it appears that a bushel of raw corn makes 5¾ pounds of pork, while a bushel of cooked meal makes 17½ pounds.

James Buckingham gives, in the Prairie Farmer, an experiment with cooked corn meal, corn in the ear, and raw meal. He put three hogs into separate pens. "One ate three and a half bushels of corn in the ear in nine days, and gained nineteen pounds. Another ate, in the same time, one and three-quarter bushels of corn ground, and gained nineteen pounds; while the third ate, in the same time, one bushel ground and boiled meal, and gained twenty-two pounds."

The society of Shakers, at Lebanon, New York, communicated the following to the agricultural report of the Patent Office: "The experience of thirty years leads us to estimate ground corn one-third higher than unground as a food for cattle, and especially for fattening pork. Hence it has been the practice of our society, for more than a quarter of a century, to grind all our provender. The same induces us to put a higher value upon cooked than raw meal; and for fattening animals, swine particularly, we consider three of cooked equal to four of raw meal. Our society, annually, for some twenty-seven years, has fattened 40,000 to 50,000 pounds of pork, and it is the constant practice to cook the meal, for which purpose six or seven potash kettles are used."

Such is the general tenor of the testimony of those who have tested cooking fairly in this country. It will be seen that most of the experiments relate to cooking grain. Steaming coarse fodder has not been extensively practiced here, but when a fair trial has been given, the result has been quite satisfactory.

Professor Horsfall, of England, has practiced mixing a special food milch cows, to produce a large yield of milk of good quality, and to keep up th flesh of the cow in a full flow of milk. He says: "I now proceed to describ the means I am using to carry out the purposes which I have sought to ex plain. My food for milch cows, after having undergone various modification has for two seasons consisted of rape cake five pounds, and bran two pound for each cow, mixed with a sufficient quantity of bean straw, oat straw, an shells of oats, in equal proportions, to supply them three times a day as muc as they will eat. The whole of the materials are moistened and blended t gether, and, after being well steamed, are given to the animals in a warm sta The attendant is allowed one to one and a half pound per cow, according circumstances, of bean meal, which he is charged to give each cow in proporti to the yield of milk; those in full milk getting two pounds each per day, oth but little. It is dry, and mixed with the steamed food on its being dealt separately. Bean straw, uncooked, is dry and unpalatable; by the process steaming it becomes soft and pulpy, emits an agreeable odor, and imparts fla

relish to the mess. In albuminous matter, which is especially valuable for ch cows, it has nearly double the proportion contained in meadow hay. i undergoes a great improvement in its flavor by steaming, and is probably roved in its convertibility as food. Rape cake has a large proportion ly thirty per cent.) of albumen, rich in phosphate and oil. * * * During May my cows are turned out on a rich pasture near the homestead, owards evening they are again housed for the night, when they are supplied with a mess of steamed mixture and a little hay, each morning and evening. I have cooked or steamed food for several years, and my experience of its benefits s such, that if I were deprived of it I could not continue to feed with satisfac- i."—*Transactions of the New York State Agricultural Society of* 1856, *page* 224.

Mr. Mechi, near London, has also practiced cutting and steaming straw mixed with materials similar to Professor Horsfall. He estimates straw worth about ten dollars per ton to feed after steaming. His experiments have been quite extensive, and the results most favorable to cooking food. His practice has not generally obtained yet in England, but it is constantly extending, and in this country stock feeders are just beginning to turn their attention to the subject

AMOUNT OF STRAW AND COARSE FODDER WASTED.

If we take the amount of grain and Indian corn raised in the United States, as by the census of 1860, we shall find, by allowing forty bushels of grain to the ton of straw or corn fodder, that there were about 30,000,000 of tons. Now, at least one-third of this is wasted for every purpose except manure, and vast quantities not even used for that. Suppose we estimate this at one-half the value put upon it by Mr. Mechi, or five dollars per ton, and we have the enormous sum of $50,000,000 wasted, for want of proper economy, in a single year. We believe this estimate much below the real loss. These facts are worthy of a thorough examination by the farmers of the whole country. Let them study own interests. Many of them will see where they have thrown away in ten years to double their property. Let them educate their sons for ling. Impress upon their minds the necessity of a thorough knowledge in the processes of nature connected with the growth of plants, and their uses ining the animal economy. Impress them with a sense of the import- of their occupation, and of its true elevation in the scale of human affairs. hem that no occupation or profession in life requires more accurate or ore thorough knowledge. Teach them that no occupation brings honor to the l, but the individual to the occupation. Above all, teach them to shut y to nothing, to examine all things, and to select that which is good.

COMPARATIVE VALUE OF CATTLE FOODS.

THE attention of the farmers of the country is now turned with more earnestness than ever before, to the raising and fattening of cattle and sheep, and for this there are several concurrent reasons.

The abrogation of the so-called reciprocity treaty, and the restrictions hereafter to be placed on the introduction from Canada of cattle and sheep, which have been brought to our markets in great numbers, afford a sufficient reason for increasing our own production.

The rinderpest, that terrible disease that has proved so fatal to the cattle and sheep of Europe, will long show its effects, and the destruction of so many thousands of cattle in England cannot fail to advance or sustain the price of our own beef. Another very strongly operating reason is found in a steadily growing feeling among the farmers of the west and northwest, that it will be more profitable to devote a larger portion of their lands to the producuon meat and wool than to keep them exclusively for wheat growing.

The rates of transportation have been placed so high, that many fa s cannot send their grain to market at a paying price. Such—and there thousands—will only grow grain enough for their own home consumption, raise and feed cattle and sheep, which can be brought to market at less c

That the economical management of food in fattening domestic animals is of the highest importance, no one will for a moment deny; yet how few am our farmers are really acquainted with most of the great principles which are involved, or understand the causes of which they in their practice see only effects. They learn from experience that some kinds of food contain grea fattening properties and some greater milk-producing qualities than others, are content with this imperfect practical knowledge, and pay no attention to an investigation of the causes of these differences.

It may be said that the education of our farming population precludes the possibility of such investigation. This is true in a measure, and the labors some of the deepest thinkers and most scientific men of the age, although absorbed in this special department, have added still more to the difficulties attending the study of this exceedingly interesting subject by the employment terms and experiments only adapted to the comprehension of those who have already acquired at least a partially scientific education. But although this fact may partly account for the existing lack of knowledge of this branch of natural science, there is no doubt that the greater portion of it is attributable to the common habit of neglecting to investigate phenomena constantly under our notice, because of our familiarity with them.

It is not, of course, to be expected that the farmer can have opportunities scientific investigation of these phenomena, but it is not unreasonable to supp that he might, in the common experiments which he is constantly making, by a judicious observation and analysis of some of the results, arrive at a sort of system, capable of a practical arrangement and adaptation, instead of following the beaten track of routine adopted by his ancestors, without even an effort at improvement. It is not enough that he should know that some kinds of grain or some roots possess fattening properties exceeding those of others, but he should understand *why* this is the case, and be able, in the possession of this knowledge, to arrive at the greatest results with the smallest possible outlay.

Plate XXII.

ıot only necessary that he should understand the values of the different › that he can make the most judicious use of them, but he should underıe principles by which they operate and become available to him, and enabled to employ those containing the most desirable elements for each ar purpose.

ıave said that most of the literature on the subject of economical nutrition ıe employment of obscure language, generally unintelligible to the farmer. ll therefore in the present article, avoid such language, and when we casion to use any of the experiments given by former writers, we will so dify them as to place them within the easy comprehension of all.

of primary importance to know the constituents of the body of the animal we consider the food to be given it; and we will, therefore, make an analthe matured flesh of ruminating animals, to which class the present ntended more especially to apply.

proportion of one hundred parts there exist, approximately—

Water	74.5
Gelatine	10.2
Fat	8.0
Phosphate of lime	4.5
Carbonate of lime	.5
Albumen	.8
Fibrin	.75
Salts, &c	.75

enters largely, as will be seen above, into constituents of all animal ; all the fluids, as well as the solids, are largely composed of it, and it is re absolutely essential in the food to a certain extent; but we shall find, er, that the foods which contain it in the largest quantities are of a less ous character than others which have it in less quantities in their compo- It is found in the different vegetables used as food in the following tions:

Potatoes	75 per cent.
Carrots	86 "
Turnips	87 "
Parsnips	79 "
Mangold wurzel	85 "
Cabbage	92 "

elative fattening properties of these vegetables will be discussed here-

tine is the material of which many of the tissues of the body are princiosed. It consists of several kinds, all nearly related, such as horn, m bones, and in cartilages. Horn is constituted nearly like albumen. of the principal elements of all animal bodies, and the skin, hoofs, (or , and coating of the mucous membranes, the lining of the cavities of estines, the windpipe, mouth, and, in fact, the lining of all the cavities rfaces of the body are largely composed of it; but these substances, al- in close affinity with each other, differ considerably in their qualities, me possess elements hardly found in others. For instance, sulphur is in the smallest quantity in the skin and coating of the mucous mem- but is quite abundant in the hoofs and horns, and more so in the hair. latine in the cartilages and bones, although different in each, is nearly l; they are both soluble in hot water, and coagulate, when cool, into a lly, such as we observe in cold veal broth. Glue is formed of gelatine. esent in the bones, and composes largely the fibres of the sinews and lig- , to which it furnishes elasticity and strength.

the next important constituent, is composed principally of starch, gum,

and sugar, and occurs in all animals, sometimes to the extent of ten per cent., and even more, of their entire weight. There are three kinds of fatty substances entering into the composition of bodies, viz: Oleine, margarine, and stearine. "Oleine is the chief component of all oils, and denotes their characteristic parts, which slowly coagulate by cold." Oils also contain another fat—margarine—which hardens quicker than oleine, and is observed in the form of crystals of the appearance of mother-of-pearl; hence it is called sometimes "mother-of-pearl fat." Stearine is the principal fat in animals; it is of a firmer texture than the others, and is the fat of mutton and beef, in which meats it is combined with margarine and oleine.

Fat is secreted in the largest quantities from food abounding in sugar, starch, and gum. These contain the three elements—carbon, hydrogen, and oxygen; the first element preponderating to the extent of at least fifty per cent.; hence these foods are called carbonaceous, or heat-giving foods. They seem to be of no great use in building up the body, but furnish, as we may say, the fuel by which the animal heat is maintained. The process by which this heat is produced is precisely similar to that of the burning of coal, gas, or other substances. The carbon of the food is exposed to the action of the oxygen of the air in the lungs, and the result is the burning of it, which produces as much heat as if consumed in the open air. Less heat-giving food is needed in hot weather than in cold, and less in warm climates than in cold. Thus the Esquimaux and Greenlanders are enabled to subsist on, and even require, fat or oily food that would be rejected by people living in a warmer climate. The body needs only a certain quantity of heat-giving food to maintain its natural temperature, and all consumed in excess of this quantity but furnishes material for future use, to be stored up in receptacles provided by nature in the body.

An accumulation of fat in the animal, caused by feeding it upon foods which abound in fat-forming principles, is therefore really food stored up in the animal for its support when needed.

Phosphate of lime, or bone lime, is composed of about 75 per cent. of lime and 25 per cent. of phosphoric acid. It occurs in all the animal tissues, and forms from 50 to 60 per cent. of the materials of the bones, to which it gives strength, and in which it occurs in the largest quantities in those most exposed to mechanical influences. Some foods furnish an abundance of this mineral, as Indian corn, and animals which have been fed upon it to any great extent are observed to be large-boned.

Carbonate of lime, or chalk, occurs in all bones, though in much less quantities than the preceding mineral. It is also found in less proportions in young than in old animals, being nearly from 1 to 4 parts in newly-born, 1 to 6 in adult, and 1 to 8 or 9 in old animals.

Albumen occurs in the blood and nerves of animals. It differs from fat in its composition, having the four elements—carbon, hydrogen, nitrogen, and oxygen—while fat contains but three.

All the organs of the bodies of animals contain these four elements, and food must necessarily contain them to be nutritious. We found the carbonaceous foods to be fat-producing or heat-giving. The nutritious foods containing the four elements are called nitrogenous or flesh-forming foods. They are all included in the three forms, albumen, fibrin, and casein, which contain the four elements in nearly the same proportions. Albumen, occurring in the blood and nerves of animals, and in eggs of birds, &c., is found in grains and vegetables in almost exactly identical composition. Boussingault gives the results of analyses performed by Messrs. Dumas and Cahours to prove this fact, as follows:

ALBUMEN.

	Animal.	Vegetable.
	53.5	53.7
	7.1	7.1
	23.6	23.5
	15.8	15.7

the principal element of which the muscles of animals are formed; the clot and globules in blood. Like albumen, fibrin is found in in nearly identical composition with that of animals. The analysis Dumas and Cahours give the following:

FIBRIN.

	Animal.	Vegetable.
	52.8	53.2
	7.0	7.0
	23.7	23.4
	16.5	16.4

is found in the milk of mammals, and is identical with that called of the leguminous seeds, such as beans, peas, &c., in which it exists idantly than in milk itself. The analyses before referred to give sition of the animal and vegetable casein as nearly identical.

CASEIN.

	Animal.	Vegetable.
	53.5	53.5
	7.0	7.1
	23.7	23.4
	15.8	16.0

ilar composition of these three substances is evident from the above. ems to constitute the most nourishing portion of milk, which is un- the standard of food, as furnishing all the essential principles for the id growth of animals; and we shall find those foods to be the most which contain casein in the greatest abundance.

ts and other minerals found in mammals, or phosphate of magnesia, urs in small quantities in the bones and fluids; fluoride of calcium, found in small quantities in the tissues, but more abundantly in the l teeth; silica, a flint which is found in the enamel of the teeth; f sodium, (or common salt,) which exists in all the tissues and in n at least six parts in one thousand.

e minerals, salt is the only one that is not supplied in vegetable food cessary quantities, and it is therefore absolutely necessary that it provided, not only because no tissue of the body can exist without blood and cartilages maintain their proper constituents, but it is in the wear and tear of the body to replace that which is abstracted lood by the excretions, for the urine and excrement, the tears and stances, have all taken it from the blood, and it must be replaced. , is necessary to the successful management of stock, and should given in quantities sufficient to satisfy the cravings of nature.

ief review of the analysis of the bodies of mammals we find them to

n *nutritive* will be used in this article for convenience, as combining the flesh- l fat-forming elements.

consist in great part of water, which is absolutely necessary in the food to be given them for nourishment, both to assist in digestion and to replace the waste which is going on, not only in the fluids, but also in the solids; gelatine, of which many of the tissues are composed; fat, which is composed principally of starch, gum, and sugar, and requires food containing these constituents to increase its secretion; phosphate and carbonate of lime, forming the bones; albumen, casein, and fibrin, forming the flesh; and various salts and chemicals contained in small quantities, but nevertheless essential, and must therefore be furnished by the food.

We will now consider the various foods used in sustaining these different parts, and their relative and comparative values for both nourishing and fattening purposes.

We have said that milk is the type of all animal food. This is apparent from the fact that in it are found all the principles necessary to support life. It is at once a liquid and solid food; a source of albumen and of fatty substances, of sugar and the salts; and, although more abundant in water than the blood, it possesses, in its principal constituent, casein, one of the most necessary elements in the food of all mammals.

The average of several analyses in this country is as follows:

Water	86.0	Or, economically:	
Casein	5.0	Water	86.0
Fatty matter	3.5	Flesh formers	5.0
Sugar	4.5	Fat formers	8.0
Mineral matter	1.0	Mineral matter	1.0

The following are analyses of the milk of different cows, as given by Boussingault:

Casein, albumen, and insoluble salts.	Fatty matter.	Sugar of milk and soluble salts.	Water.	Dry matter in 100 parts of milk.	Remarks.	Authors of the analyses.
3.6	4.0	5.0	87.4	12.6	Average of twelve analyses at Bechelbrunn.	Le Bel and Boussingault.
3.8	3.5	6.1	86.6	13.4	Average of six analyses in the environs of Paris.	Quevenne.
4.5	3.1	5.4	87.0	13.0	Idem	Henri and Chevalier.
5.6	3.6	4.0	86.8	13.2	Idem	Lecann.
5.1	3.0	4.6	87.3	12.7	An analysis at Giersen	Haidlen.

It will be perceived by these analyses that there is over eighty per cent. of water. This, at the first glance, would lead us to question its value as food, particularly as some of the roots which abound in water to the same extent are notoriously unnutritious; but if we give the matter a moment's consideration we shall see that so large a proportion is almost absolutely necessary, for we found in one analysis of the bodies of mammals that about seventy-five per cent. consists of water, which in the decompositions of the body is continually passing off, and which must be replaced. A recent writer says of this fact: "If life consists in a metamorphosis of the tissues, fluids are an indispensable condition of life, for the combinations and decompositions in its substance produced by the activities of the body cannot take place without the agency of water, and since the last result of the whole process of digestion is a liquefaction of alimentary principles, the

. of the blood is impossible without water." But not only the formation, ontinual exercise also, of the organs depends upon' their receiving a ınt of water. Without it no digestion or formation of blood, no nutri- :cretion, can exist. Even this statement, however, by no means ex- e importance of water, for it is essential not only as the medium for the ts of all dissolved substances—not only is the humidity necessary for s of which the most active, the brain and muscles, contain the greatest ı of water—but the hydrogen and oxygen which we take in water enter omposition of many elementary principles of being and are transformed onstituents of the blood. When starch or gum becomes sugar, the ation is effected by the absorption of water; for with regard to their on, a greater proportion only of water distinguishes sugar from starch, aration of oxygen from sugar causes the latter to be transformed into 'ill be found hereafter that foods which contain a great abundance of not nutritious from this fact, but from the arrangement of the other ıts, and those which are concentrated and dry must be used in connexion r to be of most value.

hen, being the prototype of a perfect nutriment, those foods which con- ıluable elements in the greatest abundance are evidently of the most he animal economy. It only remains, therefore, in a series of compar- yses of the different foods of the animals under present consideration, :r those containing the most desirable qualities, and trace the circum- ıd combinations in which they can be made of the highest utility and

›ds of all strictly herbivorous animals are derived from the mineral and kingdoms. They may properly be classified as follows:

l food—water, salts, &c.; carbonaceous or fat-forming food*—starch, su- ıitrogenous or flesh-forming food—albumen, fibrin, casein, gluten; acces- ͽat-giving food, which is also partly carbonaceous—gum, fibre.

:getable kingdom, in its various forms, supplies all these elements in [uantities and combinations, not only in the seeds and fruits, but also ›ots, stalks, and leaves. For our present purpose, we will divide able foods into three classes, viz: roots, leaves, stalks, &c., seeds, ኑ.

FOOD FROM ROOTS.

ıluable class is already appreciated at its true value. Its importance from the fact that it supplies, in the different species, all the necessary ›f food. For instance, the potato furnishes starch in abundance, which own for its fat-forming properties; the parsnip furnishes albumen and ıe beet and carrot furnish sugar—in fact, all have valuable nutritive some to a surpassing extent.

l begin our analysis of the different roots with the potato. Its con- ıre, according to different authorities, as follows:

....	75.2		Or, economically:	
c....................	1.4		Water	75.2
....	15.5		Flesh formers	1.4
....	0.4		Fat formers	18.9
....	3.2		Accessories	3.6
....	0.2		Mineral matter	0.9
....	3.2			
atter................	0.9			

bonaceous or nitrogenous foods may be called in general torms nutritive: for ıng especial mention their proper designations will be given.

Of the high value of potatoes, when used in connexion with other foods, there is not a shadow of doubt. All experimenters and observers in the economy of food agree in saying that they are of the highest utility, but they must be used with other foods whose constituents are different from those of this root. The analysis shows that potatoes surpass in the fat-producing principles—the nutritious or flesh-forming—in such proportions that they could not alone sustain the composition of the blood, for an animal fed alone on these tubers would be obliged to consume such quantities to provide the blood with the requisite proportion of albumen, that, even if the process of digestion were not discontinued, there would be a superabundance of fat accumulated beyond the power of the oxygen to consume, which would successively absorb from the albuminous substances a part of its vital elements, and thus a check would be caused in the endless change of matter in the tissues in the nutritive and regressive transformations. These roots, then, are most valuable when used with foods in which the nutritious principles more nearly correspond with the fat-forming, and we shall find, in the course of our investigations, exactly what those foods are which will develop the utility of the potato at its highest degree. There seems no doubt that the tubers are of the most value when cooked, although some writers affirm to the contrary. It seems possible to prove this fact on philosophical principles, for it is well known that the starch contained in the potato is incapable of affording nourishment until the containing globules are broken, and one of the most efficient means of accomplishing this seems to be by heat.

Boussingault, in speaking of the economy of cooking potatoes, says: "The potato is frequently steamed or boiled first; yet I can say positively that horned cattle do extremely well upon raw potatoes, and at Bechelbrunn our cows never have them otherwise than raw. They are never boiled, save for horses and hogs. The best mode of dealing with them is to steam them; they need never be so thoroughly boiled as when they are to serve for the food of man. The steamed or boiled potatoes are crushed between two rollers, or simply broken with a wooden spade, and mixed with cut hay or straw or chaff, before being served out. It may not be unnecessary to observe that by steaming, potatoes lose no weight; hence we conclude that the nutritive equivalent for the boiled is the same as that of the raw tuber. Nevertheless it is possible that the amylaceous principle is rendered more easily assimilable by boiling, and that by this means the tubers actually become more nutritious. Some have proposed to roast potatoes in the oven, and there can be little question but that heated in this way they answer admirably for fattening hogs, or even oxen. Done in the oven, potatoes may be brought to a state in which they may perfectly supply the place of corn in foddering horses and other cattle." The apparent contradiction in the remarks will be observed; but the evident leaning in favor of cooked potatoes shows that Boussingault, although paying some attention to the theory that cooked food is not generally attended with the same benefit to ruminating as to other animals, was evidently almost perfectly convinced of the truth that those which contain an abundance of starch in their constituents must be rendered more nutritious when exposed to the action of heat.

Many experiments have been made to find the comparative value of potatoes with other foods for stock.

"From recent experiments, very carefully and skillfully made, it appears that two pounds of raw potatoes afford as much nourishment as one pound of good English hay." (Agriculture of Massachusetts, 1853, p. 35.)

In the appended table we find, by our present system of analysis, the value of this tuber, both in comparison and connexion with other foods.

One of the next in value among the roots for food is the carrot. Its constituents are as follows:

	87.5
ı and casein	0.6
	6.4
	1.2
	1.0
ibre	3.3
matter	1.0

Or, economically:

Water	87.5
Flesh formers	0 6
Fat formers	6 6
Accessories	4.3
Mineral matter	1.0

: be seen that the fat-forming elements surpass the nitrogenous to such ıt that other food (as with the potato) is absolutely necessary to give its highest value. All writers and experimenters agree in pronouncing erable utility, not only in its fattening qualities, but also in its valu- : l properties.

experiments have been made to ascertain the economical value of this . Colman, in his second report on the agriculture of Massachusetts, experience of Mr. J. C. Curwen, who says: "The profits and advan- carrots are, in my opinion, greater than any other crop. This admira- has, upon repeated and very extensive trials for the last three years, nd to answer most perfectly as a partial substitute for oats. Where ten of oats were given per day, four pounds may be taken away and their plied by five pounds of carrots."

ı Quincy's experience in the cultivation of carrots was that they cost ıt eleven cents per bushel. The average cost of this root, every ex- cluded, is probably not far from thirteen cents per bushel. This small en considered in connexion with the value of the root, at once estab- e profit of its culture. The leaves of the carrot are almost as valuable ot itself, as their constituents are nearly the same. They are most when given to milch cows, as they not only increase the flow of milk rising degree, but also add to its quality.

snip is of about the same value for fattening purposes as the carrot, of the most nutritious of the roots. The average of different analyses composition as—

	82.1
ı and casein	1.7
	2.9
	3.5
	0.6
	0.7
fibre	8.0
matter	1.0

Or, economically:

Water	82.1
Flesh formers	1.2
Fat formers	7.0
Accessories	8.7
Mineral matter	1.0

ame remarks will apply to this root as to the carrot. Its comparative ll be found in the appended table.

trictly fattening purposes no root is more valuable than the Jerusalem e; but although all who have had any experience in its use agree in cing it of very high utility, its culture is neglected to a greater extent of all other roots.

esults of different analyses average as follows:

	76.0
	14.8
ı	1.0
	3.0
	1.2
	1.0
fibre	1.5
matter	1.5

Or, economically:

Water	76.0
Flesh formers	1.0
Fat formers	18.8
Accessories	2.7
Mineral matter	1.5

Abounding as this root does in fat-forming principles, to the rem extent of nearly nineteen per cent., its value when used in connexion witu K whose constituents are more nutritious is evident. The principal cause fo non-culture is probably the difficulty with which it is eradicated from the g when once introduced. But this should be almost an argument in its fa it establishes at once its hardiness, and as it yields abundantly with orau cultivation, and is not liable to the diseases with which its cousin, the I potato, is afflicted, there seems no good reason why every farmer should not tivate it to some extent, particularly as it thrives in shady places and on soil, and may be planted in some of the many patches found on all farms probably could be turned to no other use unless at great expense and labor.

The mangold wurzel, in consequence of its great yield and great nut qualities, is one of the most valuable roots cultivated for food for farm s The analysis of the three favorite varieties, as given by Mr. Cameron, a by Professor Johnston, is as follows:

	Long red.	Short red.	Orange (
Water	85.18	84.68	
Gum	0.67	0.50	
Sugar	9.79	11.96	
Casein, (so called)	0.39	0.26	
Albumen	0.09	0.18	
Fibre and pectic acid	3.08	3.31	
	99.20	100.89	

Or, economically:

	Long red.	Short red.	Orange
Water	85.18	84.68	
Flesh formers	0.48	0.44	
Fat formers	9.79	11.96	
Accessories and waste	4.55	3.81(?)	

These analyses differ from those given by Sir Humphry Davy an Herepath, a celebrated chemist of Bristol, England, presented below probably represent the nutritive properties of the mangolds in the n degree.

The leaves of the mangold are of as much nutritive value as the root if they do not surpass it.* Professor Wilson, in the Journal of the Agricultural Society of England, says: "The leaves of the plants also to possess a far higher value, both as a feeding and manuring substance we are accustomed to assign to them; in fact, in a chemical point of view are three times as valuable as the roots."

Of the value of this root in yielding immense crops there is no doubt George B. Loring, of Salem, Massachusetts, in a statement made conc this crop, showed that he raised on one acre and one-eighth of land, at of $135, (all expenses included,) 1,800 bushels of mangolds; the seed was a mixture of long red and yellow globe. The doctor remarks, in co ing his statement, as follows:

"The cost of these roots, seven and a half cents per bushel, is certai

* Johnson's Agricultural Chemistry, p. 912.

at, considering their value as food and the usual market price. They ll for seven dollars a ton of sixty pounds to the bushel, or about thirty-ls to the ton; and at this rate bring twenty cents and a fraction per The market for them is not large, it is true, but they give ample ion for the trouble and expense of raising in their benefit to milch

ling to analysis and experiment, four hundred pounds of mangold equivalent to one hundred pounds of English hay. At sixty pounds hel the crop weighed ninety-six thousand pounds, or forty-eight tons, to twelve tons of hay, taking the estimate that four tons of mangolds to one ton of hay. For the production of milk, I have no doubt that eight tons of mangolds are worth more than the thirteen and a half

be observed that the above crop was taken from but one and one-of land, on which it would of course be impossible to produce the in hay. This at once establishes the value of the root for economical There are several well established varieties of the mangold, the f which are the long orange, red globe, orange globe, and yellow e first three varieties are best suited to deep, heavy soils; and the ose of a lighter texture. For general cultivation, the orange globe best in yielding the largest crops.

sian mangold, or sugar beet, is another variety of this root. The the average analysis as given by different authors:

. . . .	82.0	Or, economically:	
. . . .	12.6	Water	82.0
. . . .	0.4	Flesh formers	0.9
. . . .	1.0	Fat formers	13.6
. . . .	0.4	Accessories	0.4
. . . .	0.5	Mineral matter	3.1
tter	3.1		

e seen that the fat-forming elements are very largely in excess of nous, and compose about thirteen per cent. of the entire root. The e sugar beet is better appreciated in Europe than in this country. forms one of the great staple products, and is used not only in the re of sugar, but also for fattening cattle, and is quite a favorite with There is considerable difference among writers in this country as to compared with other foods; but there is no doubt that it is the most f the mangolds for feeding purposes, though not so profitable in yield-crops, as it averages only about seventy-five per cent. of the yield of varieties.

a-baga, or Swedish turnip, is esteemed very highly by feeders; but s, I am inclined to think, over-estimated. The following table, the nalyses by Sir Humphry Davy and Mr. Herapath, shows the com-alue of this root with the different mangolds:

ntity of nutritious and fat-producing elements in 1.000 *parts.*

	Mucilage or starch.	Sugar.	Gluten or albumen.	Total.
nips	9	51	2	62
s	7	34	1	42
rzel	13	119	4	136
e wurzel	27¾	[illegible]	1½	134
. . . .	17¾	[illegible]	1¼	[illegible]

For feeding purposes, the ruta-baga is evidently of inferior value to tl golds, and there is but one reason why the latter should not supersede the and that is the greater difficulty attending the raising of the mangolds, superior soil which is essential for their success. The value of the rut in fact, consists in its being grown with good returns on comparativel poor soil.

The interesting experiments of Lord Spencer show pretty conclusiv comparative values of mangolds and Swedes for feeding purposes. He s two steers of about the same weight and age, one being two years nine and the other two years seven months old, and fed them on equal quanti hay, to which was added to one animal regular rations of Swedes, and other mangolds. The animals increased in weight at the rate of forty-eig a quarter pounds for every ton of Swedes, and sixty-five and a half pou every ton of mangolds.

Thinking that the difference in the increase of weight might have bee other causes than the values of the roots, he changed the diet of the tw mals, giving to the one that he fed on Swedes, mangolds, and to the Swedes. The result was, the animal fed on mangolds increased in we the rate of thirty-six and three-fourth pounds, and the other fed on Swe the rate of fifteen and a half pounds, for every ton of the roots con The great difference must have been caused by the change of the first from mangolds to Swedes; and this is proved by a third experiment. animals were fed on equal quantities of mangolds, when they both incre weight at the rate of fifty pounds for every ton consumed. His lords summing up the result of these experiments, remarks: "It will be for pr men to decide upon the value of this trial. What appears to me to be th conclusive part of it is that No. 2, who had during the first month, when f upon mangold wurzel, increased in girth three inches, in the next month his food was changed to Swedish turnips, did not increase in girth and when in the third month he was feeding again on mangold wurzel, h began to increase in girth. Because it is very well known that if an an changed from more to less nutritious food, the probable consequence will his growth will be stopped.

"The result appeared to me so decisive that I have not tried the same ment with the same accuracy since; but I did try the following year, fe cow alternately on Swedish turnips and mangold wurzel, and though I h by me the details of the trial, I remember that the result confirmed the exp of the previous year."

The white turnip is undoubtedly the least valuable of all roots for fa purposes, as will be seen by its analysis. It seems of most utility whe to milch cows, and it produces an increased flow of milk. It is of the value as a field crop only when sown on land after other more valuabl are gathered. The analysis is:

Water	90.1	Or, economically:	
Casein and albumen	1.0	Water	
Sugar	4.0	Flesh formers	
Gum	1.5	Fat formers	
Woody fibre	2.5	Accessories	
Mineral matter	0.9	Mineral matter	

The leaves of the turnip are of about the same value as the root, w also true of nearly all the preceding. The following table gives the co tively nutritive value of the different varieties of turnips:

f nutritive matter 64 drachms of the Swedish turnip afford...... 110
·f nutritive matter 64 drachms of the stored garden turnip afford.. 85
f nutritive matter 64 drachms of the Norfolk white turnip afford.. 83
·f nutritive matter 64 drachms of the common or white loaf turnip 80
·f nutritive matter 64 drachms of the Tankard, or long-rooted turnip 76

lair's Hort. Glean., p. 406.)

FOOD FROM LEAVES AND STALKS.

important portion of the food of domestic animals, of which grass and the type, is valuable, not only in furnishing essential accessory food, ·ntains, as we shall find hereafter, exceedingly nutritious and fattening ·s.

› different varieties of this food, the most valuable are the various grasses, and stalks and leaves of the different leguminous plants. Of course, ·ed space will not permit us to give an extended consideration of all ıd we must content ourselves with analyses and investigations of those uable and generally used, which are included in the various grasses ers.

ıissing the leguminous plants, it is worthy of remark that they are :d by all writers and observers to be of considerable nutritive value. ·wıng table, from analyses of Einkop, Boussingault, and others, gives ·priate composition of the green stems and leaves of some of the legu- ıd other plants, not usually cultivated for hay:

	Green pea stalks.	Spurry.	Green stalks of buckwheat.	Common vetch.	French vetch.	White lupine.	Common white field bean.	Green oats fodder.
....	80.00	7.7	82.5	77.5	79.5	86.0	85.0	82.0
....	3.40	2.3	4.7	2.6	3.8	1.3	1.5	5.0
e........................	10.31	12.0	10.0	10.4	11.5	7.0	9.0	7.5
....	4.55	......	......	......	......	......	0.2	3.5
....	0.90	2.7	0.2	1.9	0.7	1.8	1.05	1.0
....	0.65	5.2	2.6	7.6	3.6	2.9	2.25	0.5
er........................	......	......	......	......	0.9	1.0	1.0	......
of lime	0.19	0.8	......	......	......	......	....	0.5

conomical value of these will be found in the table appended to this

: grasses and clovers are included the natural and most important foods imals especially under present consideration. It is, of course, impossible tigate the comparative values of the hundreds of different species of 'ound in this country, and we shall be obliged, in this article, to speak under one general head, giving to the clovers, however, a separate con- n. It is true of grass that it combines all the elements in its composition y to support the life and physical organization of all herbivorous animals ection attainable from no other foods; for in it are united not only the s and fat-producing, but also the accessory and mineral elements. varies considerably in its composition in its various species, and their

different ages. The following are the analyses of timothy and red-top time of flowering:

	Water.	Starch.	Woody fibre.	Sugar.	Albumen, &c.	Gum.
Timothy	70.0	5.5	12.5	4.2	4.0	1.8
Red-top	71.0	3.8	13.0	4.9	3.3	1.5

Or, economically:

Timothy.		Red-top.	
Water	70.0	Water	
Flesh formers	4.0	Flesh formers	
Fat formers	9.7	Fat formers	
Accessories	14.3	Accessories	
Mineral matter	2.0	Mineral matter	

These two species will serve for our present purpose as a type of gras in fact they are the most valuable of all for food. Grass is the most va for hay before it has ripened, or, in other words, gone to seed, and i primary importance, therefore, to secure it when its most valuable consti as sugar, starch, albumen, &c., are in the greatest abundance in the stal leaves, which is the time of flowering.

This care is not the only essential, for on the process of making the h pends almost entirely its value. Dr. Robert D. Thompson, of Glasgow, land, says of this fact: "It should be an object with the farmer to cut gr the purpose of making hay at that period when the largest amount of soluble in water is contained in it. This is assuredly at an earlier period growth than when it has shot into seed, for it is then that woody matte dominates—a substance totally insoluble in water, and therefore less lated to serve as food to animals than substances capable of assuming a s condition. This is the first point for consideration in the production o since it ought to be the object of the farmer to preserve the hay for winter the condition most resembling the grass in its highest state of perfection. second consideration in hay-making is to dry the grass under such circums as to retain the soluble portion in perfect integrity."

Hay is the most valuable, therefore, which is made perfectly dry in the sl possible time and with the least possible bleaching; for the experience observers is, that hay when cured with the least exposure to the sunshi winds is much more valuable than that cured otherwise.

Fattening cattle on hay alone is the practice of many farmers, and inconsistent with economy where hay is plenty and markets are distant. A usually consume, when fed with hay alone, not far from four per centum c live weight daily, and will gain, if properly cared for, nearly two pou flesh. But it is more desirable to feed the animals on not more than th cent. of their live weight in hay, and an equivalent for the other one pe in Indian corn meal, or roots; and the gain would exceed the other sys a greater proportion than the cost of food.

It will be observed that the analyses of the timothy and red-top grass made when they were in the green state. The following is their nutritiv

ıade into hay, and also that of some other well-known species, as given ı. Flint, in his valuable work on "Grasses and forage plants."

Name of grass.	Albuminous, or flesh-forming principles.	Fatty matter.	Heat-producing principles—starch, gum, sugar, &c.	Woody fibre.	Mineral matter or ash.
nted vernal grass	10.43	3.41	43.48	36.36	6.32
oxtail	10.32	2.92	43.12	33.83	7.81
rass	12.95	3.19	38.03	34.24	11.59
rass	13.53	3.14	44.32	33.70	5.31
rass, seeds ripe	23.08	1.56	26.53	43.32	5.51
oft grass	11.52	3.56	39.25	39.30	6.37
barley grass	11.17	2.30	46.68	31.67	6.18
rye grass	11.85	3.17	42.24	35.20	7.54
e grass	10.10	3.27	57.82	19.76	9.05
	11.36	3.55	53.35	26.46	5.28
pear grass	11.83	3.42	51.70	30.22	2.83
ss	10.35	2.63	43.06	38.02	5.94
alked meadow grass	9.80	3.67	40.17	38.03	8.33
n irrigated meadow	25.91	6.53	32.05	25.14	10.37
m irrigated meadow, (2d crop)	10.92	2.06	43.90	34.30	8.82

o be understood in the foregoing remarks that the average of circum- has been considered, for, as it is well known, the composition of all very materially affected by influences of soil, cultivation, and tempera- l plants grown on poor soil are poorer in nitrogenous principles than own on a rich soil, as much as those grown in a wet season are less rich ming elements than those grown in dry seasons.

lifferent clovers constitute, probably, as valuable food for cattle gen- the true grasses, and for milch cows they excel in the principles essen- n increased flow of rich milk. The analyses of the three important ised for both fodder and hay, substantially, as given by Einhof and re as follows:

	Red clover.	White clover.	Lucerne.
	76.0	80.0	75.0
	1.4	1.0	2.2
e	13.9	11.5	14.3
	2.1	1.5	0.8
	2.0	1.5	1.9
natter and gum	3.5	3.4	4.4
r	0.1	0.2	0.6
f lime	1.0	0.9	0.8

Or, economically:

	Red clover.	White clover.	Lucerne.
Water	76.0	80.0	75.0
Flesh formers	2.0	1.5	1.9
Fat formers	3.6	2.7	3.6
Accessories	17.4	14.9	18.7
Mineral matter	1.0	0.9	0.8

As with the hay of the true grasses, the dried clover is more valuable the green, as shown by the following table:

	Red clover.	White clover.	Lucerne.
Flesh formers	22.55	18.76	12.76
Fat formers	44.00	40.00	38.00
Accessories	24.00	30.00	36.00
Mineral matter	9.45	11.24	13.24

All the above analyses of clovers were made at the time of the flowering, when the stalks and leaves contained their nutriment in the highest perfection.

The value of clover is increased instead of diminished (as with the grasses) by a slow process of curing: "It requires a longer time to cure it properly, and if exposed to the scorching sun it is soon injured even more than the ral grasses, since its succulent leaves and tender blossoms are quickly browned, lose their sweetness in a measure, and are themselves liable to be wasted in handling over." Clover should be cut, therefore, while dry and free from dew; it should be exposed to the sun only enough to thoroughly wilt it, when it should be formed into small cocks, and permitted to dry until fit to place in the barn.

Thus the tender and succulent leaves are secured in a form nearly resembling the green plant, which is a matter of vital importance in the economy of these species.

In a brief summing up of the value of the different grasses as food, it is worthy of remark, that in the dried state they furnish essential accessory food in connexion with others more nutritive.

It is an axiom that no matter how nutritious the food given an animal is, there must be a sufficient quantity of it to satisfy the beast and produce the greatest results.

If an animal in fattening requires a certain amount of nutritive food, and that food is given it in a highly condensed condition or concentrated form—as, for instance, oil-cake—but a comparatively small quantity would be necessary to have the same value in bulk of hay. But that the food may be most perfectly exposed to the action of the digestive organs it must be of a bulk sufficient to stimulate them to exertion, and grass, in its various forms, seems particularly adapted for this purpose, for we find by the different analyses that the fat and flesh forming elements, although formed in desirable quantities, are exceeded by essential accessory food in a degree surpassing all other nutriments.

Grass, then, in its various forms, is valuable as food of itself, but is of greatest utility as an auxiliary in the fattening of animals, for it gives b the more nutritious foods used in fattening them, and stimulates the dig a manner essential to its maximum perfection. It is worthy of observation although hay possesses the quality of both distending the stomach to its f

acity and affording sufficient nourishment to maintain the animal, no other d has this faculty, and this fact has caused it to be considered the standard food for herbivorous animals in the various experiments of authors.

FOOD FROM GRAINS AND SEEDS.

In this class are included not only some of the most valuable foods for the enance of animal life, but also those most esteemed as giving the highest unt of nutrition in a condensed form.

Nearly all the grains contain nutritious and fat-forming elements in the most able proportions, and some of them furnish the standard of food for the hu- race. For instance, wheat contains in its composition all the principles s y to maintain life, and beans contain a greater amount of casein, or e, than milk itself.

The grains, therefore, are of the highest value in the fattening of animals, but y must be used in connexion with other food of a less nutritious nature, and will be apparent hereafter which varieties are most valuable when used ther, and in what amounts they must be employed.

It is true of nearly all grains that they are as valuable for food with their veloping husk ground into meal with them, as when nothing but the clean i is employed; in fact, some authors affirm that the enveloping husks of of them contain more nutrition than the grains themselves. However this y be, all cereals should be broken into the form of meal to be most nutritious, d a large percentage is added to their value by the process of cooking.

This is accounted for philosophically by the following results of experiments M. Rapsail, the author of "Organic Chemistry," and M. Biot, of the French ademy of Sciences:

1. The globules constituting meal, flour, and starch, whether contained in ain or roots, are incapable of affording any nourishment as animal food until are broken.
2. No mechanical method of breaking or grinding is more than partially at.
3. The most efficient means of breaking the globules is by heat, by fermenta- or by the chemical agency of acids or alkalies.
4. The dextrine, which is the kernel, as it were, of each globule, is alone le, and therefore alone nutritive.
5. The shells of the globules, when reduced to fragments by mechanism or are, therefore, not nutritive.
6. Though the fragments of these shells are not nutritive, they are indis- ible to digestion, either from their distending the stomach or from some cause not understood, it having been found by experiment that concen- nourishment, such as sugar or essence of beef, cannot long sustain life hout some mixture of coarse or less nutritive food.
7. The economical preparation of all food containing globules or fecula con- n perfectly breaking the shells, and rendering the dextrine contained in soluble and digestible, while the fragments of the shells are at the same rendered more bulky, so as the more readily to fill the stomach.

It is with this theory and with these facts in view that the following analyses comparative values of the different grains have been made, after they were iced to the condition of fine meal or flour. It will be observed in the analy- s that all the grains contain a small percentage of water. This is present in varieties unless they are subjected to a heat of 212° Fahrenheit; but for present purpose it is desirable that they should be presented as they exist natural ripened state. The following table of comparative equivalents of ii tive natures of the different grains and seeds, as given by Boussingault, be found to nearly correspond to those contained in the table appended to

this article. Wheaten flour was assumed as the standard, and placed at the value of 100.

Wheat flour (good quality)	100	Maize	138
Wheat	107	Yellow peas	67
Barley meal	119	Horse-beans	44
Barley	130	White French beans	56
Rye	111	Rice	171
Buckwheat	108	Lentils	57

It must be borne in mind that this table presents those in their *nitrogenous* values, and that 100 parts of wheat flour are worth 138 parts of maize, or 44 parts of horse-beans. Their fattening properties will be found to differ greatly from the above in the subsequent analyses.

Wheat, from the great demand for it as the staple food of man, is of too much value to be used in fattening farm stock in most localities; but in sections rei from markets, and where transportation is difficult, no food can be grown to exceed this grain in feeding value. It is undoubtedly the most valuable of all the cereals, in combining in its composition not only the valuable fattening principles of some of the other grains, but also the nutritive elements that are essential in all foods.

The composition of wheat of average quality, with the greater part of the husks removed, is as follows:

Water	14.3
Gluten	12.8
Albumen	1.9
Starch	60 0
Sugar	5.2
Gum	1.9
Fat	1.2
Fibre	1.5
Mineral matter	1.2

Or, economically:

Water	14.3
Flesh formers	14.7
Fat formers	66.4
Accessories	3.4
Mineral matter	1.2

The practical value of wheat agrees with the theoretical. As seen by the above analysis, the flesh-forming elements constitute about 15 per cent. of the whole, and the fat-forming about 66 per cent.; the nourishment of the body is thus generously provided, and a large amount of carbonaceous material is given to cook it with. The wheat plant, like all others, is, of course, affected by circumstances of soil and temperature; that which is grown on calcareous soils is notoriously richer in gluten than that grown on others, as is also the case with that grown in warm climates in comparison with that grown in colder. The time of cutting, also, influences the quantity and quality of the grain; that which is cut a fortnight before it is ripe is found to be richer in gluten, and in fact in yield, than that cut when fully ripe.

This is shown by Professor Johnson's experiments,* the results of which are as follows:

When cut.	In the grain, per cent.			Flour, per cent.	
	Flour.	Shorts.	Bran.	Water.	Gluten.
20 days before ripe	74.7	7.2	17.5	15.7	9.3
10 days before ripe	79.1	5.5	13.2	15.5	9.9
Fully ripe	72.2	11.0	16.0	15.9	9.6

* Johnson's Lectures on Agricultural Chemistry.

Iis experiments must evidently have been made on grain with all the husks ιoved, for the gluten only existed at the most at about 10 per cent. of the ire composition, which is notoriously less than that in grains with only a por- ι of the husks left which abound in nitrogenous matter.

The most valuable of the cereals for fattening purposes, both from its compo- on and the profitable returns attending its culture, is undoubtedly maize or lian corn. Its analysis exhibits an abundance of fat-forming principles, and) a liberal supply of the nutritious. Its analysis is as follows:

ıter	15.0	Or, economically:	
ıten	11.0	Water	15.0
:h	59.0	Flesh formers	11.0
r	1.0	Fat formers	66.7
	0.3	Accessories	5.3
t	6.7	Mineral matter	——
bre	5 0		
al matter	2.0		

: same remarks will apply to this as to wheat and the other cereals re- :ding the influence of soils and cultivation on the composition of the grain; t the above is the average of several analyses of common yellow Indian corn, its ripe, dry state.

Other varieties differ essentially in the amount of some of the constituents, as, instance, the sweet corn contains not only a large amount of sugar, but also re liberal supply of gluten; and some of the flint corns are found to contain re starch and mineral matter, but, as before remarked, the above will be found exhibit the average composition of this grain.

The vital importance of crushing cereals before giving them to animals for d is most plainly manifested in maize, particularly when given to horned tle. Each grain is covered with silicious coating that is impervious to the ıtric juice, and must pass from the animal in an undigested condition. This ılmost inevitably the case with ruminating animals, which swallow the grass or r which constitutes the greater portion of their food in pellets or bunches, ich are only passed to the first stomach, whence they return to the mouth of animal to be ground up fine before they pass to the other stomachs and are ested. It is plainly impossible for most of the grains of corn, which are small, ooth, and detached, to be thus returned, and hence they pass the animal without ıferring the slightest benefit.

The comparative value of maize with other foods has been the object of much earch by experimenters; the results have been unanimously in favor of this before all others used for fattening animals. In our present system, the ue which is given to this cereal in the appended table agrees pretty nearly h the practical and theoretical estimates of others.

The stalks of the Indian corn are of great value for fodder, particularly when wn to feed in the green state; they abound in sugar, and are of especial value en given to milch cows, as they not only greatly increase the quantity of k, but also the quality.

Mr. Flint, in his work on "Grasses and Forage Plants," says of the culture of en corn for fodder: "The common practice with regard to this crop, which already been partially stated, is to sow in drills from two and a half to three ; apart, on land well tilled and thoroughly manured, making the drills from to ten inches wide with the plough, manuring in the furrow, dropping the n about two inches apart, and covering with the hoe. In this mode of cul- e the cultivator may be used between the rows when the corn is from six to e inches high, and, generally, unless the ground is very weedy, no after cul- ion is needed. The first sowing usually takes place about the 20th of May, this is succeeded by other sowings at intervals of a week or ten days, till

July, in order to have a succession of green fodder. But if it is designed to cut it up to cure for winter use an early sowing is generally preferred, in order to be able to cut it in warm weather, in August or early in September. Sown in this way, about three or four bushels of corn are required for an acre, since, if sown thickly, the fodder is better, the stalks smaller, and the waste less."

Meal in which are ground both the cob and grain is of about three-fifths of the value of that composed of the grain alone; the ripe cob is only valuable in furnishing accessory food, as the woody fibre and mineral matter of which it is principally composed contain no nutritive matter.

The next most valuable of the cereals for fattening purposes is rye, and its nutritive elements are in valuable proportions with the fat-forming, as will be seen by the analysis, which is as follows:

Water	13.00	Or, economically:	
Gluten	10.79	Water	13.00
Albumen	3.54	Flesh formers	14.33
Starch	50.14	Fat formers	55.81
Gum	5.31	Accessories	14.81
Sugar	4.74		
Fat	0.93		
Woody fibre	9.50		
Mineral matter	2.05		

This grain, like wheat, furnishes valuable food for man, and in some localities constitutes the favorite diet, as in Germany, Russia, and other European countries, where it is made into what is called "black bread," which is exceedingly nutritious and healthful. It is valuable for fattening stock, but the demand for it is so great for other uses that its employment for this purpose is unprofitable. Of the profit attending the cultivation of this grain there is no doubt. Indeed, some pronounce it the most profitable of the northern grain crops, but this statement may require modification.

The dark color of the meal or flour of this grain is owing to the presence of the enveloping husks of the kernels; if these are removed the flour is nearly as white and delicate as that of wheat. But the presence of these husks is desirable from the fact that they furnish not only valuable accessories, but the bread is actually more nutritious; for in these coverings of all grains are contained much more of gluten and fat than in the kernels themselves. The objection which many persons make to the flour in which the husks are ground, namely, that the hard tissues that it contains excite an injurious irritation in weak digestive organs and cause diarrhœa, is not of sufficient importance to reduce the value of this food, and there is no good reason why it should not be used much more extensively than it is.

There is but little difference in the values of rye and barley for fat purposes. In fact the latter grain is in some districts the favorite, both in natural and malt state.

The composition of barley is as follows:

Water	13.9	Or, economically:	
Gluten	13.0	Water	13.9
Starch	47.5	Flesh formers	13.0
Sugar	4.1	Fat formers	52.0
Gum	3.5	Accessories	16.9
Fat	0.4	Mineral matter	4.2
Fibre	13.4		
Mineral matter	4.2		

Many experiments have been conducted both in Europe and tl cc to ascertain the relative value of barley and malt. Professor Thom 1

100 pounds of barley would produce, by experiment, 34.6 pounds of milk, 100 pounds of malt would produce 26.2 pounds; and the same amount of vould produce relatively 7.66 pounds and 6.35 pounds of butter. These d in connexion with other foods which were alike in different experi- . Professor Thompson remarks of these results: "By the present mode comparison, then, it appears that in every point of view malt is inferior to y as an article of diet for cattle, as it gives less milk and butter, and di- shes the live weight, instead of increasing it, which barley does under the circumstances." Of the value of barley as a crop there can be no question, its large returns, together with its valuable fattening properties, render it tly a favorite. The malt is used most profitably when given to milch cows. ymen in the neighborhood of cities secure the malt of distilleries for this ose, and all agree in pronouncing it of great utility.

Oats are of the least value for fattening purposes of all the cereals, and, un- e the others, the meal is most nutritious when made from the kernel alone. hen made into bread, it possesses very great nutrition and excellence. It is h in flesh formers, and consequently valuable for food for the laboring classes, furnishing elements contained in a meat diet, which is not always attainable them. This is particularly the case in portions of Europe, where it furnishes of the principal articles of food. The composition of oats, after most of husk has been removed, is as follows:

	14.0	Or, economically:	
albumen	18.0	Water	14.0
n	39.9	Flesh formers	18.0
	5.3	Fat formers	51.1
	2.8	Accessories	14.7
	5.9	Mineral matter	2.2
e	11.9		
matter	2.2		

It is a fact worthy of remark, that of 100 pounds of oats, two-ninths, or ut 23 pounds, consist of husks, which are of no value as food. Oats are valuable as food for horses, and in this country are used almost entirely stock.

wheat, although valuable for fattening purposes, is grown but little in ountry comparatively with other grains; and when it is grown, it is used frequently as a green manure. We find in a preceding analysis the com- on of the green fodder of this plant. The composition of the grain when is—

	14.0	Or, economically:	
	9.0	Water	14.0
n	48.0	Flesh formers	9.0
	2.5	Fat formers	52.1
	2.5	Accessories	23.3
	1.6	Mineral matter	1.6
ody fibre	20.8		
ral matter	1.6		

The good returns, easy cultivation on poor soils, and ability to stand extremes emperature, render this a desirable grain on the farm, and there is no reason y it should not occupy as high a position as some of the other cereals.

The xt seeds in the economy of the farm are the leguminous, which are uable for fattening purposes than any of the preceding, although they a larger proportion of *nutritious* matter than any of the cereals. The table gives the composition of the different varieties, as given by

Braconnot and Einhof, in Professor Johnson's Lectures on Agricultural Ch istry:

Constituents.	Peas.	Kidney beans.	Field beans.	Lentils, di
Water	12.5	23.0	15.6	
Husk	8.3	7.0	10.0	
Legumen, albumen, &c	26.4	23.6	11.7	
Starch	43.6	43.0	50.1	
Sugar	2.0	0.2	2.2	
Gum, &c	4.0	1.5	6.0	
Oil and fat	1.2	0.7	....	....
Salts and loss	2.0	1.0	4.4	

Or, economically:

Water	12.5	23.0	15.6	
Flesh formers	26.4	23.6	11.7	
Fat formers	46.8	43.9	52.3	
Accessories	12.3	8.5	16.0	
Animal matter	2.0	1.0	4.4	

These analyses differ materially from those of the same seeds grown in country. Whether the difference is owing to the influences of soil or clin I am, of course, unable to say. Probably both have their effect. The in the following analyses were very dry and well ripened:

Constituents.	Peas.	Kidney beans.	Field beans.	Lentils, d
Water	14.2	15.0	14.9	
Casein	23.1	23.9	24.0	
Starch	38.0	35.1	35.7	
Sugar	2.0	2.1	2.0	
Gum	8.7	8.5	8.7	
Fat	1.9	2.1	2.0	
Woody fibre	9.8	9.8	9.5	
Mineral matter	2.3	3.5	3.2	

Or, economically:

Water	14.2	15.0	14.9	
Flesh formers	23.1	23.9	24.0	
Fat formers	41.9	39.3	39.7	
Accessories	18.5	18.3	18.2	
Mineral matter	2.3	3.5	3.2	

For our present purpose we will use the last analyses, both because the made of seeds grown in this country, and, like the other seeds, before cons they were perfectly ripened and naturally dried. The casein in the l alysis corresponds in nature to the legumen in the others.

The only remaining food used for fattening animals is the cake compo the hemp and linseeds, called oil-cake. With the great fattening proper

e all are acquainted. The composition of this cake, as given by Pro- ohnson, is as follows:

Constituents.	English linseed cake.	American linseed cake.
	10.05	10.07
	39.10	36.25
and gluten	22.14	22.36
	11.93	12.38
	9.53	12.69
tter (ash) and sand	7.25	6.35

omically:

	10.5	10.07
ers	22.14	22.26
s	51.03	48.63
s	9.53	12.69
atter	7.25	6.35

analyses, the only ones available to me at present, show not only valu- ning properties, but also rich nutritive elements, and establish this as e most valuable of the concentrated foods.

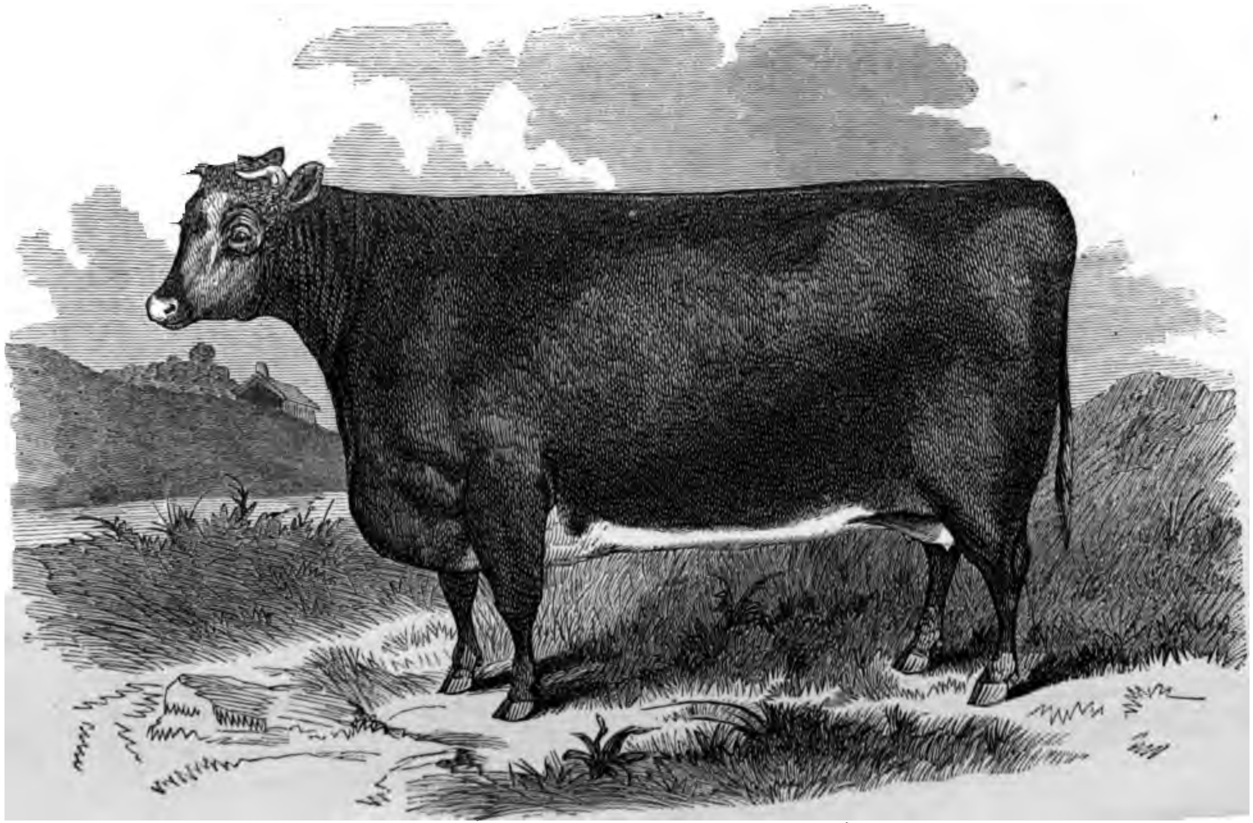
now acquainted with the composition of the different kinds of food animals, and it only remains for us to arrange them into a con- rm and prepare tables of their comparative equivalents, to be able to the value of each, and also the kinds which may be used together the ntageously. It is of course impossible to make any calculations re- e cost of the various kinds, as they vary in different localities. The f grass and hay, as they appear in the following table, are the results ng the analyses of all the species hitherto considered; they will prob- sent the constituents of the superior quality of English hay as grown ntry.

Table of comparative equivalents, prepared from the preceding anal

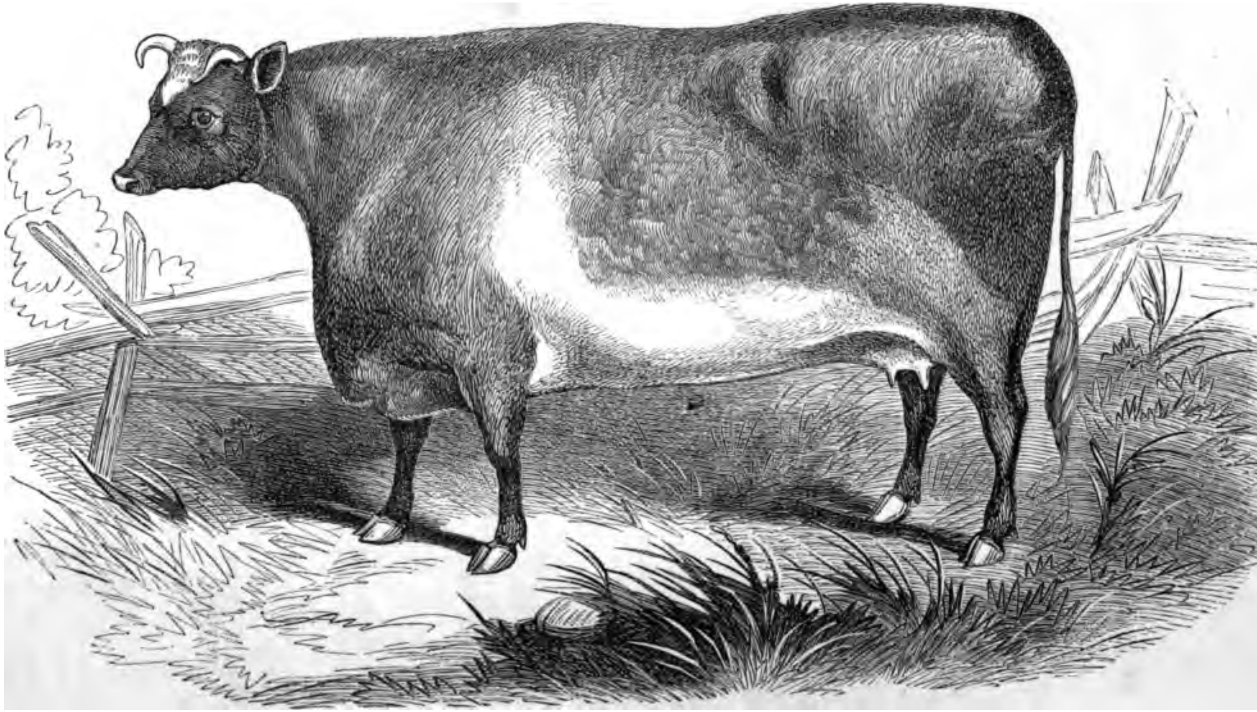
Foods.	Percent'ge of flesh formers in 100 pounds.	Percentage of fat formers in 100 pounds.	Total nutritive percentage in 100 pounds.	Nutriti
Irish potatoes	1.4	18.9	20.3	
Carrot	0.6	6.6	7.2	
Parsnip	1.2	7.0	8.2	
Jerusalem artichoke	1.0	18.8	19.8	
Sugar beet	0.9	13.6	14.5	
Swedish turnip	1.0	5.2	6.2	
Common white turnip	0.9	3.3	4.2	1
Mangold wurzel	1.0	12.6	13.6	
Green pea stalks	0.9	7.9	8.8	
Spurry, (green)	2.7	2.3	5.0	
Green stalks of buckwheat	0.2	4.7	4.9	1
Common vetch, (green)	1.9	2.6	4.5	1
French vetch, (green)	0.7	4.7	5.4	
Green stalks of white lupine	1.8	2.3	4.1	1
Green stalks of white bean	1.0	2.7	3.7	1
Green oats, (fodder)	1.0	8.5	9.5	
Green timothy grass	4.0	9.7	13.7	
Green red-top grass	3.3	8.7	12.0	
Superior English hay	13.5	36.3	49.8	
Red clover, (green)	2.0	3.6	5.6	
White clover, (green)	1.5	2.7	4.2	1
Lucerne, (green)	1.9	3.6	5.5	
Red clover, (hay)	22.5	18.7	41.2	
White clover, (hay)	18.7	40.0	58.7	
Lucerne, (hay)	12.7	38.0	50.7	
Wheat flour	14.7	66.4	81.1	
Indian corn	11.0	66.7	77.7	
Rye meal	14.3	55.8	70.1	
Barley meal	13.0	52.0	65.0	
Oat meal	18.0	51.1	69.1	
Buckwheat meal	9.0	52.1	61.1	
Peas	23.1	41.9	65.0	
Kidney beans	23.9	39.3	63.2	
White field beans	24.0	39.7	63.7	
Lentils	25.7	38.9	64.6	
English linseed cake	22.1	51.0	73.1	
American linseed cake	22.2	48.6	70.8	

A careful examination of this table, prepared from the best English, can, and German authorities, and a comparison of the money value of articles of food, modified as experience may suggest, with their feeding v here given, would be of immense benefit to the farmers, and save them th of dollars, often injudiciously expended.

Plate XXIII.



SHORT-HORN COW "JESSIE."



SHORT-HORN COW "PRIZE FLOWER," 8 YEARS OLD.

... of D. McMillan, Xenia, Ohio.

AMERICAN DAIRYING;

; RISE, PROGRESS, AND NATIONAL IMPORTANCE.

BY X. A. WILLARD, A. M., OF HERKIMER COUNTY, N. Y.

iry has become an important branch of national industry. It is rapidly over new fields, and is engaging the attention of farmers in the west- western, and middle States, wherever the lands are adapted to grazing are springs and streams of living water. The dairy districts, though vely limited, embrace a larger area than has been commonly supposed. ue, there are extensive plains at the south and southwest where the f dairying cannot be carried on, but broad belts and isolated patches re scattered over our vast domain, well adapted to grazing, and such en taken in the aggregate, cover a wide extent of territory.

ire two causes that have been operating the past few years to stimu- evelopment of this branch of industry, and have caused it to a-sume s that give it a distinctive feature of nationality. The first is a large sing foreign demand for dairy products; the second is the American "associated dairies," now brought to such wonderful perfection that ss can be readily introduced into new sections with all the ease and of success in producing the qualities attained in old dairy districts.

eign demand for cheese, it is believed, will be permanent, and exporta- year to year must largely increase, since the finest American grades wledged to be equal to the best manufactured abroad, while the cost ion is so much less as to render competition with European dairies an er on our part. This fact alone gives confidence to those about pon the business of dairy farming—that it will be remunerative and

ion, as the texture and flavor of cheese have been improved, a large and has sprung up, which requires large quantities to meet its wants. ed by many that the home demand, for years to come, will more than with increased production; and home sales for the last two years n to prove that this view is not without foundation.

constantly increasing home trade and a reliable market abroad, no farming to-day offers prospects of better or more permanent remunera- he dairy.

EMENT OF CHEESE DAIRYING AS A SPECIALTY—ITS HISTORY, ETC.

tory of American cheese dairying has never been written, and perhaps nce at its rise and progress will not be out of place.

making began in Herkimer county, New York, more than fifty years upwards of twenty years its progress was slow, and the business was zardous by the majority of farmers, who believed that over-production the result of those making a venture upon this specialty. The fact, radually became apparent that the cheese makers were rapidly bet-

tering their condition, and outstripping in wealth those who were engaged grain raising and a mixed husbandry.

About the year 1830 dairying became pretty general in the towns of Herkimer county north of the Mohawk, and some years later spread through the southern district of the county, gradually extending into Oneida and adjoining counties. Up to this period, and for several years later, little or no cheese was shipped to Europe. It was not considered fit for market till fall or winter. It packed in rough casks and peddled in the home market at from five to eight cents per pound. All the operations of the dairy were rude and undeveloped; the herds were milked in the open yard; the curds were worked in tubs pressed in log presses. Everything was done by guess, and there was no order, no system, and no science in conducting operations.

In 1840 the value of the dairy products of New York—butter, cheese, milk—was estimated by the United States census returns at $10,496,021, in all the States at $33,787,008. Some idea of the comparative increase be found when it is known that the value of the butter products of New York alone, in 1865, was more than $60,000,000.

From 1840 to 1850 cheese began to be shipped abroad, the first shipment being inaugurated under the auspices of Herkimer county dealers.

In 1848–'49 the exports of American cheese to Great Britain were 15,386 pounds. Much of the cheese manufactured this year was of poor quality. British shippers claimed to have sustained heavy losses. There was a moderate demand the following year, and prices fell off a penny a pound, ranging, from fair to strictly prime, from 6 to 6¼ cents for Ohio, and 6 to 6¾ for York State. The exports in 1849–'50 were 12,000,000 pounds, and continued to vary, without important increase, for several years. From September, 1 to September, 1859, the exports of cheese to Great Britain and Ireland only 2,599 tons, and in the following year, for the same corresponding period they were increased to 7,542 tons.

During the early part of the year 1860, Samuel Perry, of New York city, native of Herkimer, and one of the earliest operators in the cheese trade, endeavored to control the market, purchasing the great bulk of cheese manufactured in the country. He was possessed of great wealth, and had for years enjoyed the confidence of dairymen, and being liberal and straightforward in his dealings was enabled to secure the dairies by contract, making his purchases at from to 10 cents per pound. Then commenced the exportation of American cheese on a scale hitherto unknown in the history of the trade; and to him belongs credit of opening up a foreign market for this "class of goods." The exportation of cheese from New York to Europe during 1860 was 23,252,000 pounds, which was increased on the following year to 40,041,000 pounds.

About this time (1860) the associated dairy system began to attract attention. Several factories were in operation in Oneida county, and were turning superior article of cheese. The system had been first inaugurated by Williams, a farmer living near Rome, in that county, and was suggested by mere accidental circumstances. Mr. Williams was an experienced and skilful cheese maker, and at a time when the bulk of American cheese was poor. dairy, therefore, enjoyed a high reputation, and was eagerly sought for by buyers. In the spring of 1851, one of his sons, having married, entered upon farming on his own account, and the father contracted the cheese made on both at seven cents per pound, a figure considerably higher than was being paid for other dairies in that vicinity. When the contract was made known to his son, he expressed great doubt as to whether he should be able to manufacture the character of cheese that would be acceptable under the contract. He had never taken charge of the manufacture of cheese while at home, and never had given the subject that close attention which it necessarily requires, he felt th

in coming up to the required standard would be a mere matter of chance. ıtner therefore proposed coming daily upon the farm and giving the cheese ıg a portion of his immediate supervision. But this would be very incon- ıt, and while devising means to meet the difficulties and secure the benefits ; contract, which was more than ordinarily good, the idea was suggested he son should deliver the milk from his herd daily at the father's milk- . From this thought sprung the idea of uniting the milk from several boring dairies and manufacturing it at one place. Buildings were speedily d and fitted up with apparatus, which, proving a success, thus gave birth associated system of dairying now widely extended throughout the north- tates.

e system of associated dairies, during the last eight years, has been carried he New England States and into the Canadas. It is largely adopted in and has obtained a foothold in Wisconsin, Illinois, Iowa, Kansas, and States. It is known abroad as the "American system of dairying," and culiarities are so well adapted to the genius of our people as to give it a ctive character of nationality.

RESS OF THE FACTORY SYSTEM IN THE STATE OF NEW YORK, AND CAPITAL INVESTED IN THE BUSINESS.

; number of cheese factories in the State of New York at the commence- of the season 1866, is more than 500. The following table will show the r of factories erected in the State each year since 1850:

Year of erection.	No. of cheese factor's erect-ed each year.	Year of erection.	No. of cheese factor's erect-ed each year.
....	1	1860	17
....	....	1861	18
....	....	1862	25
....	4	1863	111
....	2	1864	210
....	3	1865	52
....	3	1866	46
....	4		
....	4	Total, April, 1866	500

500 factories will probably average 400 cows each, making a total of) cows, which, at the low cash value of $40 each, give an aggregate of ,000.

lands employed in associated dairying in New York cannot be less than ɪn of acres, which, at an average of $40 an acre, would amount to ,000.

ive the following table, collected from official sources, showing the amount ıl invested in factory buildings, the number of hands employed at the , average number of cows delivering milk, pounds of milk, and pounds

of cheese made during the season of 1864, at 425 factories. The summa
made by counties, and is as follows:

Counties.	No. of factories.	Cost of buildings and apparatus.	Persons employed.		Average No. of cows.	Pounds of milk used.	Pound cheese
			Males.	Females.			
Allegany	6	$17,000	9	11	1,395	1,006,445	1
Broome	1	3,000	1	2	500	643,510	7
Cattaraugus	3	8,000	6	7	1,474	192,730	......
Cayuga	1	3,500	1	2	270	837,550	8
Chautauqua	11	43,720	27	24	3,003	6,423,689	62
Chemung	3	1,800	5	4	107	764,850	2
Chenango	19	54,556	31	41	6,505	17,917,494	1,87
Cortland	8	36,354	19	26	5,000	13,714,985	1,40
Erie	7	18,925	13	22	2,248	4,128,380	43
Essex	1	3,500	2	5	1,000	2,648,657	26
Fulton	2	8,500	3	4	800	....	......
Herkimer	31	79,975	57	63	11,499	32,157,583	3,09
Jefferson	78	76,858	101	77	14,088	32,618,713	3,35
Lewis	32	52,546	55	63	12,084	33,531,746	3,17
Livingston	2	1,200	4	2	68	....	1
Madison	34	72,100	55	74	11,635	33,037,450	3,42
Montgomery	9	33,500	17	19	3,250	5,747,902	47
Niagara	1	225	3	2	36	....	
Oneida	80	156,084	135	178	27,146	70,414,328	8,10
Onondaga	4	12,200	5	6	825	2,631,304	1,27
Orange	20	57,583	54	26	5,837	9,962,949	72
Oswego	21	40,100	31	38	6,815	13,450,857	1,3
Otsego	35	44,500	40	47	7,055	15,455,437	1,55
St. Lawrence	4	9,000	6	9	1,375	2,348,322	32
Steuben	1	175	3	2	31	....	1
Sullivan	2	1,050	4	......	235	....	
Tompkins	2	7,200	5	11	1,550	3,237,512	[illegible]
Washington	2	5,580	3	5	450	461,696	[illegible]
Wyoming	5	14,200	10	11	2,245	4,343,153	4
Total	425	862,931	705	781	128,526	307,677,242	32

From the foregoing statistics it would not be practicable to deduce g
results to show the relative products and profits of manufacturing in the s
counties, since some of the factories were in operation only part of the s
A better estimate can be made from the following statistics, gathered fro
New York State census returns, showing the operations of 133 factories s
from the whole number, and working through the season of 1864. The
were made up and published in the Tribune soon after the returns were
pleted, and for convenient reference the factories are numbered from 1 t
inclusive.

showing the capital invested in buildings, persons employed in manufac-
ig, number of cows, season of beginning and closing operations, pounds
lk and pounds of cheese, at 133 *different factories in various parts of*
state of New York, for the year 1864.

...nties.	Number.	Capital invested in buildings and apparatus.	Persons employed. Male.	Persons employed. Female.	Average number of cows.	Season began—	Season ended—	Pounds of milk used.	Pounds of cheese made.
gus	1	$2,500	2	2	420	May 5, 1864	Nov. 3, 1864	1,192,730	124,284
na	2	5,500	3	2	475	May 10, 1864	..... do......	1,436,192	141,728
	3	5,000	3	2	350	May 3, 1864	Nov. 1, 1864	1,178,553	122,415
	4	3,120	3	2	508	May 2, 1864	Oct. 10, 1864	1,408,832	138,852
	5	3,500	3	4	520	June 28, 1864	Oct. 15, 1864	842,693	82,214
o	6	2,000	1	2	375	April 11, 1864	Nov. 18, 1864	1,403,356	114,429
	7	2,500	2	1	350	May 2, 1864	Nov. 12, 1864	1,154,504	121,800
	8	3,000	2½	3	550	April 18, 1864	Oct. 31, 1864	1,755,000	175,146
	9	4,000	2	5	500	May 10, 1864	Nov. 3, 1864	1,012,692	136,27[illegible]
	10	3,000	1	3	450	April 14, 1864	Nov. 1, 1864	1,171,911	113,564
	11	4,000	1	3	380	April 5, 1864	Nov. 15, 1864	1,172,590	122,960
	12	2,600	2	2	415	April 27, 1864	Oct. 29, 1864	1,227,786	127,345
	13	3,683	1	2	400	May 9, 1864	Nov. 1, 1864	1,162,252	126,254
	14	2,460	1½	2½	400	May 10, 1864	..... do......	1,124,485	111,799
	15	5,000	3	3	700	May 11, 1864	Oct. 20, 1864	1,481,740	148,174
....	16	5,000	3	2	600	May 9, 1864	Oct. 28, 1864	1,982,801	207,634
	17	5,000	3	4	800	April 9, 1864	Nov. 10, 1864	2,076,340	209,360
	18	5,937	3	3	550	May 26, 1864	Oct. 31, 1864	1,717,600	171,760
	19	4,500	2	4	900	April 10, 1864	Nov. 1, 1864	2,067,399	208,747
	20	2,847	1½	3	400	April 19, 1864	Oct. 29, 1864	1,261,119	128,478
....	21	2,400	2	4	534	May 14, 1864	Oct. 22, 1864	1,122,844	111,539
	22	1,000	2	6	851	May 8, 1864	Dec. 10, 1864	2,458,633	249,603
....	23	3,500	2	5	1,100	April 15, 1864	Nov. 15, 1864	2,648,657	264,865
....	24	4,000	2	3	460	April 21, 1864	Nov. 7, 1864	1,502,723	151,960
	25	5,000	2	4	448	May 24, 1864	Nov. 25, 1864	1,728,169	178,152
	26	3,000	3	2	400	May 12, 1864	Dec. 1, 1864	1,367,266	136,809
	27	2,500	2	2	475	Mar. 15, 1864	Dec. 10, 1864	1,760,000	176,000
	28	4,000	3	2	690	Mar. 9, 1864	Dec. 18, 1864	1,764,119	173,815
....	29	4,000	3	2	600	May 15, 1864	Oct. 29, 1864	1,418,351	142,518
	30	....	3	3	450	April 26, 1864	Oct. 31, 1864	1,327,074	134,050
	31	700	2	3	300	May 19, 1864	Oct. 8, 1864	493,866	49,386
	32	2,000	1	1	300	May 28, 1864	Oct. 22, 1864	598,756	58,875
	33	5,000	2	2	325	May 27, 1864	Nov. 1, 1864	747,393	71,000
	34	2,000	1	2	540	April 20, 1864	Oct. 15, 1864	1,282,621	128,846
	35	2,500	2	2	750	May 1, 1864	..... do......	1,700,000	165,000
	36	4,000	3	3	625	May 9, 1864	Nov. 1, 1864	1,636,644	162,000
	37	1,500	2	2	325	May 11, 1864	Oct. 31, 1864	505,600	50,560
	38	2,156	2½	1	425	May 3, 1864	Nov. 7, 1864	1,033,485	106,268
	39	1,500	1	2	325	May 11, 1864	Oct. 28, 1864	765,388	75,004
	40	2,538	3	2	480	May 9, 1864	Oct. 31, 1864	1,244,428	127,685
	41	1,000	2	2	450	May 1, 1864	Nov. 1, 1864	1,306,144	124,649
	42	1,000	1	3	319	April 22, 1864	..... do......	872,378	91,639
	43	4,000	5	5	1,200	May 1, 1864	Nov. 15, 1864	3,977,720	364,000
....	44	3,000	3	3	850	April 10, 1864	..... do......	2,369,112	247,120
	45	3,600	3	4	600	May 23, 1864	Oct. 22, 1864	1,376,964	150,437
	46	2,196	3	2	327	May 3, 1864	Oct. 23, 1864	839,824	87,536
	47	3,000	2	4	750	April 14, 1864	Oct. 27, 1864	1,902,295	207,121
	48	2,500	2	3	580	May 11, 1864	Nov. 5, 1864	1,379,871	165,165
	49	1,500	1	2	400	May 10, 1864	Nov. 1, 1864	994,730	102,835
	50	2,500	2	3	580	May 11, 1864	Nov. 5, 1864	1,379,871	165,165
	51	1,500	1	2	400	May 10, 1864	Nov. 1, 1864	994,730	102,835
	52	2,550	2	3	425	May 2, 1864	Oct. 25, 1864	1,507,373	155,559
	53	3,000	2	4	700	April 25, 1864	Nov. 5, 1864	3,079,262	296,259
	54	3,500	3	3	600	May 20, 1864	Nov. 1, 1864	1,397,076	145,941
	55	3,300	2	3	730	April 18, 1864	Nov. 2, 1864	2,024,503	210,010
	56	1,000	1	3	460	May 5, 1864	Oct. 15, 1864	1,235,000	130,000
	57	2,500	3	3	625	May 19, 1864	Nov. 4, 1864	1,700,653	177,115
	58	1,200	1	3	300	May 3, 1864	Nov. 1, 1864	899,254	89,016
	59	2,500	2	2	550	May 16, 1864	..... do......	1,738,437	182,111
....	60	5,000	3	3	900	April 22, 1864	..... do......	2,772,188	272,460
	61	2,000	2	3	450	April 25, 1864	Nov. 5, 1864	1,566,872	155,400
	62	3,000	2	3	500	April 12, 1864	Nov. 4, 1864	1,703,670	170,284
	63	5,000	2	3	850	April 4, 1864	Nov. 23, 1864	2,824,179	284,379
	64	3,000	2	3	600	April 7, 1864	Nov. 5, 1864	2,046,083	199,639

Table showing the capital invested in buildings, &c.—Continued.

Counties.	Number.	Capital invested in buildings and apparatus.	Persons employed. Male.	Persons employed. Female.	Average number of cows.	Season began—	Season ended—	Pounds of milk used.
Madison	65	3,200	2	2	400	April 12, 1864	Nov. 7, 1864	1,356,000
	66	1,600	2	2	350	April 25, 1864	Oct. 25, 1864	1,220,000
	67	3,000	2	3	575	April 20, 1864	Nov. 1, 1864	1,200,000
	68	1,000	1	3	450	May 1, 1864	Oct. 20, 1864	705,990
	69	3,000	4	2	575	April 22, 1864	Oct. 28, 1864	1,880,000
	70	2,500	3	3	650	May 21, 1864	Nov. 15, 1864	2,265,543
	71	2,300	1	4	400	April 18, 1864	Nov. 4, 1864	1,175,117
Montgomery	72	2,500	2	2	325	May 23, 1864	..... do	975,625
	73	3,400	3	2	500	April 16, 1864	Nov. 10, 1864	1,473,6[illegible]9
	74	5,000	2	3	450	June 6, 1864	Nov. 7, 1864	1,308,069
	75	3,000	2	2	340	April 11, 1864	Nov. 1, 1864	990,589
Oneida	76	2,400	2	2	380	May 2, 1864	Oct. 22, 1864	819,832
	77	1,800	2	2	450	May 27, 1864	Oct. 17, 1864	826,282
	78	1,800	2	2	588	May 1, 1864	Oct. 31, 1864	1,639,9[illegible]0
	79	4,000	3	7	1,000	April 20, 1864	Nov. 1, 1864	3,027,913
	80	2,000	2	2	350	April 25, 1864	Oct. 25, 1864	802,500
	81	2,000	2	2	300	May 2, 1864	Oct. 22, 1864	802,359
	82	2,000	2	2	400	April 11, 1864	Nov. 10, 1864	1,000,000
	83	1,200	2	3	400	April 25, 1864	Oct. 24, 1864	850,005
	84	3,000	2	3	425	April 18, 1864	Nov. 1, 1864	1,3[illegible]9,330
	85	2,600	2	3	650	April 11, 1864	Oct. 31, 1864	1,065,621
	86	2,100	2	3	350	April 8, 1864	Oct. 29, 1864	1,028,794
	87	2,000	2	4	600	April 14, 1864	Oct. 1, 1864	1,670,000
	88	3,500	2	5	900	April 11, 1864	Nov. 20, 1864	2,227,295
	89	1,500	1	2	350	April 18, 1864	Nov. 15, 1864	1,059,579
	90	1,000	1	2	300	May 1, 1864	Nov. 1, 1864	832,252
	91	5,000	1	3	530	May 3, 1864	Oct. 29, 1864	1,419,251
	92	4,000	2	3	525	May 20, 1864	Dec. 18, 1864	1,866,917
	93	4,000	2	4	500	April 1, 1864	Dec. 1, 1864	2,020,400
	94	2,500	2	3	400	April 5, 1864	Oct. 29, 1864	769,908
	95	2,000	1	1	400	April 12, 1864	Nov. 20, 1864	915,562
	96	1,500	1	2	350	May 11, 1864	Nov. 1, 1864	1,777,500
	97	3,400	2	4	725	April 17, 1864	..... do	1,883,004
	98	2,500	2	3	550	May 1, 1864	..... do	1,484,443
	99	3,000	3	3	550	April 4, 1864	Oct. 31, 1864	1,746,784
	100	3,000	3	3	400	April 29, 1864	..... do	1,416,750
	101	3,000	2	34	325	April 28, 1864	Nov. 1, 1864	745,092
	102	3,000	3	2	675	April 18, 1864	Nov. 12, 1864	2,177,920
	103	2,400	2	2	350	April 25, 1864	Nov. 5, 1864	1,114,238
	104	1,800	2	2	430	April 4, 1864	Nov. 30, 1864	1,331,048
	105	3,000	2	5	500	April 18, 1864	Nov. 10, 1864	1,410,590
	106	1,500	2	2	400	April 25, 1864	Nov. 1, 1864	1,184,591
	107	2,300	2	2	480	..... do	Oct. 29, 1864	1,318,412
	108	5,000	2	3	700	April 11, 1864	Oct. 31, 1864	1,900,060
	109	2,200	2	2	420	April 20, 1864	..... do	1,453,352
	110	3,600	2	3	575	April 1, 1864	Nov. 30, 1864	2,051,688
Onondaga	111	3,200	1	3	400	May 1, 1864	Nov. 1, 1864	1,331,304
Oswego	112	2,200	2	2	475	..... do	Oct. 1, 1864	1,400,000
	113	2,000	2	1	500	June 13, 1864	Oct. 15, 1864	800,000
	114	2,500	2	3	500	April 15, 1864	Oct. 3, 1864	488,288
	115	1,000	1	2	300	April 19, 1864	Sept. 29, 1864	322,804
	116	2,000	2	2	400	April 15, 1864	Oct. 15, 1864	1,443,032
	117	2,500	2	1	350	May 25, 1864	Nov. 15, 1864	803,718
	118	3,500	2	4	600	May 12, 1864	Oct. 29, 1864	1,714,269
	119	2,700	2	1	375	April 7, 1864	Oct. 15, 1864	1,117,873
	120	1,600	1	2	350	April 15, 1864	Oct. 22, 1864	1,137,948
	121	2,500	1	3	300	May 16, 1864	Oct. 1, 1864	515,430
	122	2,000	1	3	400	May 10, 1864	Nov. 2, 1864	1,215,185
Otsego	123	4,200	2	4	500	April 1, 1864	Sept. 1, 1864	1,226,700
	124	3,000	1	2	500	Mar. 9, 1864	Dec. 12, 1864	1,749,974
	125	3,000	2	2	400	April 25, 1864	Dec. 6, 1864	1,446,871
	126	2,000	2	2	500	April 19, 1864	Oct. 29, 1864	1,140,000
	127	3,200	2	2	280	..... do	Oct. 31, 1864	881,539
St. Lawrence	128	3,000	1	2	375	May 17, 1864	Oct. 23, 1864	1,107,373
Tompkins	129	1,200	3	7	900	May 2, 1864	Nov. 3, 1864	2,871,042
Wyoming	130	3,000	2	2	400	June 8, 1864	Nov. 2, 1864	820,803
	131	3,000	2	3	600	May 31, 1864	Oct. 29, 1864	1,243,469
	132	3,000	2	2	350	May 15, 1864	Oct. 25, 1864	990,000
	133	2,500	1	2	505	April 25, 1864	Nov. 12, 1864	1,139,121

ve statistics present the following aggregates: Cost of buildings and $378,187; persons employed, (males,) 258; persons employed, (fe-2; number of cows used, 67,034; pounds of milk used, 187,822,838; cheese made, 18,943,435; average number of pounds of milk for one 9.915; pounds of milk to a cow, 2,802; pounds of cheese to a cow, e of cheese at 20 cents per pound, $3,788,687; average value of cheese $56 52.

ces at which cheese sold in 1864 ranged from 10 to 30 cents, and av-out 20 cents.

antity of salt used to 100 pounds of cheese was reported from 377 fac-n 101 of these the amount used was 3 pounds; in 87, 2½ pounds; in unds; in 40, 2 7-10 pounds; in 19, 2 4-5 pounds; in 9, 2 pounds, and unds. The least quantity used was .3 of a pound. In Limburg cheeses ity was much greater, ranging from 14 to 17 pounds

ld be proper to remark that since 1864 considerable improvement has e at many of the factories, in securing a better quality and larger quan-eese from a given quantity of milk.

paring the quantity made per cow, as deduced from the foregoing sta-th that made in family dairies, it should be remembered that the facto-ot in operation during the whole milking season, and therefore due should be made on this account. These statistics are of interest, and und of great value, as comparisons can be made of the product of cows it parts of the State.

COST OF MANUFACTURING CHEESE IN FAMILIES, ETC.

ty counties of the State family dairying is still largely in practice, and o compare the two systems understandingly, it will be well to make an of the actual cost of manufacturing cheese in families, after the ordinary -say from a dairy of forty cows—together with the care and marketing ne. We estimate from the point when the milk is in the vats, putting c., on a gold basis:

cost of cheese house, including tables, &c	$410 00
heater	50 00
ops, curd knife, &c	40 00
	500 00

nterest on original outlay	$35 00
id, say half time, for nine months, including board	60 00
ne about the dairy, turning cheese, &c., say average of one ch day, for nine months—25 days, at $1	25 00
st of fuel and its preparation for vats and curing room	15 00
ie boxing and marketing cheese, including team, say two days nth—18 days, at $1 50	27 00
ear and tear of dairy utensils and keeping buildings, &c., in	15 00
	$177 00

ows, averaging 500 pounds of cheese per cow, gross amount, 20,000 cost per pound for manufacturing, 9 mills; thirty cows, 15,000 pounds, lls; twenty cows, 10,000 pounds, 17 mills.

be seen, then, that the cost of barely manufacturing cheese in single ll average a little more than one cent per pound; and this sum, for the is the actual cost in cash paid out, for we have not taken into account

the general care and supervision necessary in the manufacture and curing of cheese, which cannot be entrusted to domestics, but must daily occupy the time and attention of the proprietor or some member of his family, who has somet beyond mere wages to stimulate to action. And here it may be proper to serve that one of the inconveniences which is widely felt among dairymen, r from the difficulty of obtaining careful and reliable hands for the managem of the dairy. If it is desirable to make first class cheese, that will command m market the highest price, all the operations of manufacture must be perfor by tried and skillful hands, hands that can rarely be obtained for hire, and when obtained commanding comparatively large wages.

Now as cheese making is an art which must be learned like other trades, as most of its operations are performed by females, the dairy farmer may be sa to have, for the most part, nothing but apprentices in his employ; for when his dairymaid has been carefully taught the trade, she marries, and is at once lost to him.

This scarcity of skilled cheese makers is severely felt throughout the whole dairy region, necessitating the farmer and his family, and more especially the female portions, to arduous labor; taxing their strength to a degree that heavily on health and constitution. The result is, that persons prematurely aged and with broken health are more frequently found in a dairy region than in other farming communities.

The introduction, within a few years past, of improved dairy apparatus it is true, lessened the labor of cheese making; but the business still de the same skill and careful oversight; the want of one or relaxation of the o resulting not only in immediate loss, but exerting a damaging influence upon the reputation of the dairy.

There is no desire to say one discouraging word of a business which has added so much wealth to the country, and in which those who are engaged generally prosper, and soon become independent in worldly goods, but the truth must be told, nevertheless. Wealth has its advantages, but its price should be kept view, and if overtasked muscle, incessant care without relaxation, and, finally, disease, is to be the patrimony of wives and daughters, its charms, to say the least, are very much diminished.

A point of some moment to those engaged in cheese making is high skill and perfection in manufacture. It is not deemed necessary to enumerate all reasons why this does not generally obtain. The fact is patent that choice cheese is made by a comparatively small number, rather than the majority of dairymen.

Even among those noted for producing a strictly prime article, the process of manufacture, as well as other work of the dairy, is at times hurried and neglected, and must be necessarily so from the nature of things. It does not to keep an extra force on hand to take the place of those who may be di by accident or sickness, or who from other causes are obliged to suspend work.

Occasional periods of farm labor, too, demanding immediate and pr attention, occur more or less frequently; the result of which is imperfect c which must be marketed as such and at corresponding prices.

One or all of these causes have been in operation in every dairy, and continue to occur from time to time. What the losses from this source through the year depends of course on the many and various circumstances that have controlling influence in each particular case. We have known it to be large enough, in many instances, to cover the whole cost of manufacturing the entire cheese of the dairy for the year.

Dairymen are conversant with these facts, and they are points to be considered, and should have their proper bearing in making up our estimate of the two systems.

ADVANTAGES OF THE FACTORY SYSTEM.

he advantages claimed for the factory system are, superior quality, uniform-higher prices, saving, by buying at wholesale, such materials as salt, bandage,), boxes, &c., and, finally, relieving the farmer and his family from the ry of the manufacture and care of cheese.

is not pretended that a better quality of cheese can be made at the factory n in families, but that it is quite as fine as the best, and therefore above the e of that manufactured in small parcels. We have enumerated some of causes that conspire to depreciate the quality of cheese when made in single es; these are not present in the factory system.

The agent or superintendent makes it his business to see that all parts of the are properly performed. He employs skillful workmen, and his interest reputation are at stake, prompting him at all times to do his best. He ws that neglect or mistakes will not be tolerated, and the desire to satisfy s interested, in order to secure their patronage, stimulates him to make exertion to build up and sustain a reputation for "fine goods." He has convenience at hand for manufacturing to advantage and making the busi-a sole employment. He is not liable to be disturbed by other matters might serve to call his attention away from time to time, to the prejudice immediate work at hand.

The same rule must hold good with him as among those engaged in other pro-and arts; for he who gives his whole attention and energies in a certain ion is likely to become more skilled, and arrive nearer to perfection in his than he who is striving to do many and diverse things at the same time—especially in cheese manufacture under this system, as a high degree of m is expected, and jealous and interested eyes are daily watching and noting ery short-coming. Uniformity and fine quality are more likely to obtain der this system, and whatever progress can be made towards improvement naturally develop itself more rapidly here than among persons scattered a broad extent of country, and who are so occupied with a variety of work to have little time to spend in the improvement of any one particular branch. The factories, so far as we are acquainted, have acquired a high reputation fine quality and uniformity.

At some of these establishments we have seen a large number of cheeses, ing in the aggregate more than a hundred thousand pounds, so uniform in earance, as they lay on the tables, that the most practiced eye could detect cely any difference in their manufacture. Such a quantity of cheese uniform e and quality will usually command a higher price in market than that e dairies, from the fact that in the latter an allowance is always made purchaser for unequal or imperfect cheese.

have alluded to some of the causes that operate to increase the price of made factory cheese over that of private dairies. Another may be added, saving of time, trouble, and expense in purchasing. The whole quantity from six hundred or a thousand cows can be bargained for and bought in same time and at no more expense than a "twenty-cow dairy." This item unts to a considerable sum in the aggregate, as experts are employed by the ipal commission houses in cities, by shippers and dealers, to select and e cheese, under salaries ranging from $500 to $1,000 per year. Others, n, get a certain percentage on what they buy. These sums, of course, out of the producer, and hence by so much must depreciate the price of

We come now to consider the most important advantage to farmers in this arrangement. It is the relief from the drudgery of cheese making, and co ant care and attention necessary in properly curing and fitting the ior market. It would be difficult to estimate this in dollars and cents,

since health enters into the account more largely than is generally susp It is believed, and we speak advisedly, that the old method of cheese m has done more to injure the health of women in cheese dairying districts any other cause. Much of the work about the dairies ought to be perf by men; but too often the manufacturing and most of the care of cheese ar left wholly to females, overtasking their strength by hard and exhaustive thereby laying the foundation of weakness and disease.

As the same process has to be gone through with in manufacturing ch whether the quantity of milk be large or small, and as nearly the sa also is occupied, it will be seen that what requires the labor of a great m persons to do, when cheese making is divided up in families, can be accomplished with but few persons on the factory system—some five or six being sufficient to do all the work about an establishment manufacturing the milk of a thou or more cows.

OBJECTIONS TO THE FACTORY SYSTEM.

The objections urged against cheese factories are, difficulty of dete adulterated milk; the carrying of milk to the factory, and liability of milk; difference in quality of milk, arising from the manner in which cows are fed and managed; the loss of whey; and the necessity of manufacturing early and late made cheese in the family. These are the principal objec urged by dairymen. As the milk is measured at the factory and each cr with the amount daily furnished, it is evident that, when there is a conside quantity, a dishonest person could add water, and thus increase the number o gallons. Such cases have occurred, and the individuals cheating have summarily expelled from the association. We know of no instrument or chanical device that will detect, with perfect reliability, watered milk, an therefore a watchfulness on the part of the superintendent, and the exclusion from the association of persons of doubtful honesty, are the only means of meeting the difficulty.

Some object to the labor and trouble of carrying milk to the factory, and the necessity of keeping regular hours for its delivery under all circumstances of weather, &c., since no delay at the factory can be made for the milk of a dairy without hazarding the acidity of a large quantity—at least that contained in one vat—besides deranging in some degree the regular factory work. Others contend that, having the milk, the cheese can be made by the family with little more trouble and labor than that of carting the milk, while one's own and convenience can be studied at pleasure, and the cheese be at all times immediate control.

Without extra care and cleanliness as to the pails and milk cans there is liability of sour milk from time to time, which, of course, would not be received at the factory, as milk only slightly acid would damage that with which it in contact. The milk cans for carrying the milk, it may be observed, are what difficult to cleanse and to keep sweet; and the confinement of the and its agitation while being carried in hot weather, render it susceptible w change, especially if there be the least taint of acidity about the cans.

Dissatisfaction often occurs at the factory with regard to the condition of milk the superintendent being certain that the milk is slightly and perhaps perc bly changed, while the farmer stoutly insists that it is perfectly sweet; and he goes home in no pleasant mood, complaining that his cans were not perfectly cleansed, laying the fault of the sour milk upon some member of his family, or disbelieving that the milk was changed. If the milk is not received at t factory, it is a loss to the stockholders. Hence it will be seen that more or trouble is brought about on this account. Not unfrequently bad feeling is engendered on the part of the farmer and his family, and he withdraws from the association.

ι her objection is urged, and with some apparent reason, that the quality κ varies with different persons, according to the manner in which the rs are supplied with food and are managed throughout the season. It is conded that clean, sweet, upland pasture, an abundance of food, and plentiful pply of pure water, cattle wintered well and receiving careful treatment in ry respect, will produce a better quality of milk, from which more and better can be made, than when the reverse is practiced. And yet the poor herd nas been wintered improperly, that is pastured on the coarse herbage of ds, with general bad treatment on the part of the owner, is credited acuing to the quantity furnished on an equality with the better herd. It is ; easy to see how this can be remedied without excluding such from the assotion.

Then there is the loss of whey, which is regarded by some to be an important m in pork making, or as a feed for cows—for the whey is the property of the rson who runs the factory; but even were it given the farmers, there is the ble and expense of carting it home. An objection is also urged against the stem, that in fall and spring, when the cows are "coming in" or being dried , the quantity of milk is too small to be carried with profit to the factory; it the family butter is to be made; that it pays better to take off the cream utter and turn the skimmed milk into cheese; and that, therefore, as the y does not do away wholly with cheese making in families, cheese appaand implements are necessary; and if the spring and fall cheese are to be e at home, the other portion of the dairy may as well be made there also. bjection could be partly met by setting the milk and taking off a part of cream and delivering the milk every other day, or at longer intervals.

We have now presented both sides of the question, and are prepared to adice another step in the discussion, which brings us to—

THE ORGANIZATION, SELECTION OF FACTORY SITES, ETC.

Cheese factory associations are organized in neighborhoods of ten or a dozen re farmers.

When it is proposed to start a factory, if enough are found willing to turn in dairies, so as to make a fair start, say 300 cows, a committee is appointed ook further into the matter, to visit factories, and get all the information on ubject that can be had. The favorable report of the committee being had, y then organize, choose directors, and adopt some general rules or plan for guidance of the association. The next step will be the selection of some erienced cheese maker as superintendent, and the plan for the erection of the tory building.

Generally some person proposes to put up the building on his own account, l to manufacture and take care of the cheese at a fixed price per pound, deing a contract on the part of the farmers to furnish the milk of the requisite nber of cows for a certain number of years.

The milk of about 400 cows, it is believed, is the smallest quantity that can employed by the manufacturer (when cheese making is his sole business) to a fair living compensation for services, while the milk from a thousand 's can be manufactured at but little extra expense, comparatively.

FACTORY SITE.

n choosing the place for the erection of the factory buildings two requisites sought after—good water and convenience of access and distance for the ies furnishing the milk. The site, above all, should command an abundance ure spring water. This is regarded by those who have had longest expece at the business as imperative.

Even in family cheese making a considerable quantity of water is needed in various ways about the dairy, for curding milk, cooking the curd, and keeping the utensils and buildings clean and sweet; but, for the factory, the quantity of water should be abundant and unfailing. It is usual to have a considerable stream of water passing under the manufacturing room, so as to carry off the drippings of whey and refuse slop, so that there be no accumulation of filth or taint of acidity hanging about the premises.

When whey and slop are allowed to collect from day to day about the milk room, the stench at times becomes intolerable and must do great damage to milk, which absorbs taints of every character with great readiness. Hence means must be taken to have all the refuse matter swept far beyond the premises. Some factories are being built where dependence for water is placed upon wells of large capacity, but there are as yet great experiments to be tried. At all events it will be seen that much more labor will be required, with greater liability to taints, than when spring water, passing in considerable streams under the building, can be had.

COST OF MANUFACTURE AT THE FACTORY.

The cost of manufacturing cheese is, to the farmer, one cent per pound, net, salt, bandage, annatto, and boxes, as well as carting the cheese to m[illegible]s, being charged to the association and paid by each dairyman in proportion to the quantity of milk furnished during the season. The whey, as has been before observed, belongs to the factory. All other expenses, including the care of the cheese while curing, &c., is paid by the manufacturer.

To run a factory using the milk of 600 cows will give constant employment to at least four persons, half or more of whom may be females. Before the war, when prices had not become inflated, the actual cost of manufacturing the from 600 cows was about $700 for the season. This sum does not cover i[illegible]est on capital invested for buildings and fixtures, but was the amount paid for labor, board, fuel, &c.

From these data it will be easily estimated what amount of money can be realized from the business of manufacturing. Allowing that the 600 cows produce, on an average, 400 pounds of cheese each, there will be in the aggregate 240,000 pounds. The cost of a well-constructed factory will not be far from $3,000.

We have then 240,000 pounds, at one cent		$2,400
Cost of running factory	$700	
Interest on buildings, &c	210	
Annual wear and tear, or depreciation of property	200	
		1,110
Profits		1,290

Now, for 300 cows, nearly the same expense would be incurred, and the factory account would stand thus :

120,000 pounds of cheese, at one cent		$1,200
Expense of running factory	$700	
Interest on capital invested	210	
Annual depreciation of property	200	
		1,110
Profits		90

do not pretend to give the exact figures in the above estimate, but it will een that a factory manufacturing the milk of a less number than 300 cows not be a very paying business, unless the manufacturer can have most of work performed by members of his own family.

DELIVERING THE MILK.

When a factory is located in a neighborhood where all or nearly all the dairy- are on one street, some one of the number may be employed to gather up milk of the several dairies, and deliver it at the factory. Neighbors living each other may take turns, each delivering one day out of the week. When are hired to gather up and deliver the milk for a neighborhood during the n, the price paid for such delivery is one dollar per cow.

TREATMENT OF THE EVENING MILK.

In cheese manufacture an important point to be considered is the proper man- ement of the evening milk, and to do this to the best advantage the state of atmosphere must be observed at the time the milk is placed in the vats. k room should be cool, airy, and free from impurities. In hot and sultry er much care and attention must be given to have the evening's milk well sed to the atmosphere, and thoroughly cooled down before it is left at rest ne night. When there are large quantities of milk to be attended to in hot ier it will be better to spread it thinly over a considerable surface, rather deeply, as in filling the vats the temperature of the evening's milk should so reduced that it will stand in the morning at about 62 or 63 degrees, and it ald be reduced to at least 62 degrees before leaving it for the night. At the ies, where carrying the milk and mingling it together from several dairies doubtless a tendency to hasten its acidity, there is more necessity for care attention than in families; or, rather, there is more danger of souring.

It may be proper to observe that the requisite degree of acidity in milk to the of setting it with the rennet for a cheese is imperfectly understood by the rality of cheese makers, and must be learned by well and carefully con- ed experiments. It is not possible to make so good a quality of cheese from recently drawn from the cow, or from any milk that has been kept too sweet, rom milk that has acquired proximate acidity—that is, after the ordinary od of cheese manufacture. Neither will it be possible to obtain the greatest ntity of curd from the milk so manufactured. Such milk will require a nent of sour whey, which will be considered under its appropriate head fur- her on.

At the factories, it is believed there is more danger from too much acidity than rwise, since there are many causes to hasten that condition of the milk which not present in family dairies. In the factories it is usual to cool the even- milk to about 60 degrees, by letting in water between the vats, by the use ice, and by lifting and stirring the milk. This, under all circumstances, is, or ald be, attended to. The lifting or stirring of the milk, and exposing it to nosphere, not only serves to cool it down to the desired temperature, but operates favorably on the condition of the milk for the production of fine , since the stirring and lifting process allows the animal odor and impuri- es to pass off more readily. If a considerable quantity of milk directly from cow be placed in the vat and cooled down without proper exposure to the iere it retains more or less of this taint, and more especially if the cream es to the surface, forming a barrier to escape and holding it in the milk. urge, then, that the lifting, stirring, and pouring of the milk, so as to come in contact with the atmosphere, is of material benefit.

Some idea may be had of the effect of this animal odor by placi mill cently drawn in a vessel where it is closely confined and excluded fr air In a few hours it becomes fetid and putrid. In family dairies too little at tion is given to this point in the treatment of milk.

PROXIMATE ACIDITY OF MILK FOR FINE CHEESE.

The requisite acidity in milk for producing the best results in cheese m facture has not been treated by American writers on the dairy, and is very imperfectly understood by most dairymen.

Experienced cheese makers have observed the fact that milk which has been cooled down to a low temperature and kept very sweet, requires more rennet to form the curd, and when coagulated is longer in cooking, and often will not work down firm, but will be soft and spongy, forming what is termed a "honeycomb cheese." Many times a superabundance of whey is retained and ca be pressed out; this soon becomes sour and putrid; the cheese does not cure evenly, but goes on depreciating in quality until it reaches a high state of decomposition, giving off an offensive odor, and not unfrequently requiring an immediate removal from the shelves to the pig-pen. When cheeses swell and puff up the whey oozes out, carrying a portion of the butyraceous matter, changed to oil, and are saved with difficulty, and when saved, cannot be marketed at half the ordinary price of good cheese.

The principal features of this character of cheese are given, that it may be identified, and because large quantities are annually made, during spring and fall, many dairymen not knowing where the trouble lies or how to obviate the difficulty. Now, this results from manufacturing from milk that is *too sweet*, and which should have been treated with sour whey. The use of sour whey in cheese manufacture, when the temperature of the evening's milk has been kept low, we deem of imperative necessity, if uniform cheese of firm quality be desired. It may be observed that milk should never have acquired sensible acidity at the time for setting with rennet, but should nevertheless be well on its way towards that point. By sensible acidity, we mean acidity that can be detected by the taste or smell. Some milk is more acid than other soon after being drawn from the cow, and often, *when freshly drawn*, will redden litmus paper, yet to the taste is perfectly sweet. The milk from cows fed with whey, or slop, is more acid than that from those which get nothing but grass on sweet upland pastures. But if by chance or accident the milk is sensibly changed when about to be made into cheese it should be set at a low temperature, and all the subsec operations hastened as far as practicable.

APPLICATION OF SOUR WHEY.

When the evening's milk stands in the morning at or below sixty-two deg the morning's milk may be added to it, and at the time of putting in the re is quantity of sour whey should be added, and stirred into the mass, in the proportion of two quarts whey for sixty or seventy gallons of milk. If the night's milk stands below sixty degrees a large quantity of whey may be used, and the quantity of whey always graduated according to the degree of sweetness o milk. If the evening's milk stands at or above sixty-five degrees in the m ing, no sour whey need be used, as the milk is on its way towards a chan or has acquired a sufficient acidity to render the use of the whey not only un e sary, but a damage, from excess of acid.

When milk has not been treated with sour whey at the time of adding the rennet, and there is difficulty in cooking the curd, it will be better to add to the mass while cooking, a sufficient quantity of sour whey to harden up the curd; but it is

ways better, when practicable, to use the whey at the time of setting the cheese, by that means, the coagulation is rendered more perfect, while more of the tyraceous matter is retained, and the cheese is consequently richer and of er texture and flavor.

When acid is used in this way to assist the rennet in its work of coagulation, passes off in the whey, and in pressing and in the cheese room, leaving the eese sweet, mild, firm, rich, and of the finest texture. It has none of the char-:eristics of cheese made from milk sensibly sour; as, in that case, it will be rd and retain an acid taste.

In hot weather there will be no occasion to use the whey, unless the milk is oled down with running water to a low temperature and so held through the it. We may remark here that it is presumed that the milk room, dairy uten-s, &c., are kept sweet and clean; for if otherwise, it will be useless to attempt iformity of manufacture—for no degree of skill in manufacture can counteract the damage done when the milk is constantly absorbing sour or putrid ema-ions, or where taints are received from unclean dairy utensils.

The whey should be distinctly acid, about like that coming from a sweet curd summer weather and standing twenty-four hours. If the weather be cool the y must be kept in a warm atmosphere to acquire the requisite acidity.

k treated as above with sour whey will produce curd that will be all that be desired, which will work down evenly and without trouble, the cheese ng with a firm, compact texture, retaining more of the butyraceous matter, having that mild, rich, pleasant flavor peculiar to first class cheese. Atten-to this matter, and a little experience and observation in the use of the whey, l, we are convinced, work a marked improvement in the quality of spring and cheese, while at the same time it will add in quantity, and save that which ld otherwise go off in the whey and be lost.

SIZE OF CHEESE.

In starting a manufactory some little anxiety will be had in regard to the most able size of the cheese to be made. This doubtless must be controlled from to time by the market for which the cheese is manufactured. The southern trade prefers a medium size flat cheese—say from thirty to forty pounds, pressed in fifteen, sixteen, or seventeen inch hoops. This style of cheese uld be about five inches thick. For shipping to Europe there seems to be growing demand for cheese of moderate size. The cheddar is now very much favor for exportation—a cheese fifteen and a half inches in diameter and twelve d a half inches high, and when made smaller, in like proportions. In former ars cheeses weighing from one hundred and forty to one hundred and fifty pounds ere in favor among the American dairies, but this size is now considered too rge for the foreign trade, and a size not beyond sixty or eighty pounds in eight is more saleable. Small cheeses are easily handled, and in case of acci-nt, either at the factory or in carrying to market, the loss is not so great as in the er cheeses. Some of the factories for several years past have been making a ed number of immense cheeses, weighing seven hundred or more pounds ch, and the sales of such have been in advance of the small size; but it is be-ved that for extensive sales, the market generally would regard them as objec-ble. Ready sales of small lots of these large cheeses could doubtless be e at an extra price, because, being rare, they excite more or less curiosity and uce purchases at the shop where they are cut and sold. But such cheeses of no better quality than the smaller size; they are more liable to be broken; too large for families that are in the habit of purchasing a cheese from time , and therefore can never become popular for the general trade.

COST OF PRODUCING MILK IN OLD DISTRICTS.

The question of the cost of producing milk should be determined on (dairy farm. The estimates should be carefully made and compared \ sales, and it will then be seen whether the business is profitable or not. have entered upon an extraordinary phase in the history of American ta and our necessary annual expenditures must for years to come be greatly (those of the past. They must be met manfully, and ways devised for prov for their extra calls on our earnings and profits. They cannot be met by herds and a shiftless and improvident mode of farming.

The average annual yield of the cows must be brought up to six hundr more pounds of cheese per head. We must learn the means of keeping stock on a less number of acres, and at the same time supplying the herds a greater abundance of food at a less amount of labor in obtaining it.

It has been remarked by Liebig that cows driven long distances to pa unless they get an extra supply of food, yield milk poor in casein or cheesy ter; the materials which would otherwise have formed that constituent (milk being used in repairing the waste of muscles and other parts employ locomotion. This fact is lost sight of by many farmers. Herds that are pelled to travel long distances for water, or which are occupied a consid(portion of the day in getting a supply of food, yield less milk, and of a] quality, than when they can fill themselves quickly and lie down to re: manufacture their food into milk. In administering food to milch cows consideration should be the maintenance of a healthy, robust condition. secured, the increase and improvement of their milk may be realized by p due attention to securing quiet among the herds, and supplying the requisit from which good milk may be produced.

OLD DISTRICTS UNFAVORABLY AFFECTED.—A FOREIGN MARKET NOW DEMA:

But it is claimed that there is one feature with regard to cheese associ(that operates injuriously on the interests of old dairy districts. Cheese da: is no longer a privileged business, narrowed down to a few places, where skill in manufacturing has built up an enviable reputation. It is opened many localities. What has been acquired by long years of patient to science and experience, is at once opened to whole communities, where th of manufacture is unknown. They pick off the best cheese makers, they factories, and meet in the market on an equality. So long as dairying was ducted on the old system, this could only be done so slowly and gradua not to influence the trade for years. Doubtless in this respect the factorie unfavorably on those who would prefer to see dairying confined within n(limits, and the fears that the business may be overdone are not altog groundless. But the step has been taken, and it is too late now to look It remains for us to make a market sufficiently large to take all our pro In what manner this can be done is obvious. The quality of American c must be improved, so that it will be sought after in all the markets of Eı There is no reason why American factory cheese may not become as not its line as the wines of Johannisberg, the porcelain of Sevres, the sword b of Damascus, or the shawls of Cashmere. We can compete with the dair of the old world as to prices, and when we shall be able to outdo th(quality, a market for our "goods" is secured for all coming time.

The business of cheese dairying is now assuming large proportions, an increase rapidly under the stimulus of rapid sales, high prices, and the fac offered for manufacture under the factory system. How far this influx of

s to influence prices remains to be seen. Without a market in Europe, ply, it is evident, will be so great as to glut the home trade and render dairying unprofitable. It is true, nature seems to have hedged the dairy a certain limits.

immense plains of the west and south, as well as large portions of the States, are not adapted to dairying. The lands are deficient in springs eams of living water; the soil is of such a character that grasses soon out, and pastures become brown and dried, or afford scanty herbage long e midsummer.

These lands are better adapted to wheat and corn, or the production of beef itton and wool, and hence will not naturally be employed for the dairy. ll there are large tracts of lands suitable for milch cows, and should they erally devoted to the dairy, we may possibly find the annual supply of e so great as to sensibly affect prices. There is no question of more rtance, none of more vital interest to the dairyman, than this matter of et—a market that is enduring and remunerative.

PERMANENCY OF THE SYSTEM.

he questions have been frequently asked: Is the factory system destined to the test of years? Is it to continue to prosper, or will it not soon break up dairymen return again to the old order of cheese making? In my opinion o live. The system is a progressive step, and all history teaches that that is taken it is difficult to retrace it.

oubtless some may remember when the wool and the flax grown on the were spun and woven in the family. We shall never return to that again, e we cannot afford it. They can be more cheaply manufactured by as-ited capital, substituting the untiring arm of the machine for one of living cle. The flesh and blood of our wives and daughters are of too much con-ence to be worn out by this ceaseless toil, when the spindles and looms en by steam or water power can relieve them of the burden at a fraction of t it costs in home manufacture. Why, then, should a neighborhood of dairy-i do the work of cheese making in families, employing many hands, when an be performed equally well by half a dozen persons in a well constituted ory?

Progress is a law of nature. From the earliest dawn of creation there has n a constant series of improvements in progress. Geology reveals that the er orders of sensitive beings gave way to those of higher grade, until the result of physical creation was attained in the creation of man, whose im-rement, as a rational creature and an immortal soul, is still destined to be ard and upward.

The inauguration of associated dairies is rapidly producing a revolution in c toms and heretofore fixed ideas. It teaches the important lesson that rs can adopt successfully the same means that have proved so beneficial the merchant, the banker, and the commercial man of the world. By a olidation of interests, the dairymen of to-day can wield a power and influ-e never before reached. The vast capital in lands and herds is of a substan-and permanent character, while the aggregate product of the farms, annually unting in value to millions of dollars, compels respect from those who would that the proper province of the farmer was merely to till the soil, leav-ior others to divide the profits realized in marketing his productions.

It has been suggested that an arrangement could be made by which leading pean houses would take choice factory brands direct from the producer, advance, through an agent in New York, the stipulated price. Whether e could be realized in this way than by the present system, under which

the country buyer gets one commission, the house in New York another, and the shipper a third, is a matter that needs investigation.

But the dairyman with his herd of fifty or one hundred cows, standing alone has a circle of influence whose radius extends but little beyond his farm. is, in a measure, at the mercy of corporations and speculators, who, by oper together, may fix prices and control the trade. When associated with others neighborhoods, in towns, in counties, and in the State, he becomes formidable and meets on equal terms the community of dealers with whom he is oper

BUTTER FACTORIES.

Another feature springing out of the system of associated dairies, and of national importance, is the production of butter at factories in connexion with the manufacture of cheese. Its importance will be more readily seen when it is known that the finest quality of butter can be produced under this system, thus avoiding immense losses resulting from a poor article, as manufactured in private families, together with the saving effected by turning the skimmed milk into cheese. It takes more skill and science to make cheese than butter. Cheese making is a chemical process; butter making is mechanical.

The cheese makers are, as a class, inferior butter makers. Some have at to account for the poor butter in cheese producing counties, on the ground that no limestone region can produce a prime article. They assert that soft water is indispensable in butter manufacture.

There are many errors afloat in the world—errors so old and so well established that they are difficult to be overthrown. I do not propose to argue point, or to waste breath upon fine spun theories. Facts are opposing forces of more power than words, and, with due respect to the opinions of others, it is believed that as nice butter can be made in the hard water districts as in the famed butter regions. But the cows must be good, fed upon old, sweet, upland pasture, with abundance of pure water, the milk and manufacture perfect. Cows fed on beets and onions will not make good butter, even if it be washed in the softest water.

There are butter makers, even in the hard water districts of Oneida county, New York, who pack in Orange county pails, who manufacture specially for consumers in New York and Philadelphia, and whose butter is pronounced by competent judges equal to the best brought into those markets. I have seen as good butter made upon the black slate hills of Herkimer county, New York, as any in the soft water regions—butter that would keep at least nine months as sweet as a nut and as nice as could be desired. These are facts. I have no theories to advocate, and no feeling in the matter further than stating the truth.

The cheese makers have no conveniences for making butter; they have no order nor system in managing the milk. Their milk is often set in a d atmosphere, in cheese vats, or mixed up with cheese utensils, and the therefrom has an unpleasant, and often a cheesy flavor. They do not the butter making to careful manufacturers, but set their raw hands to the w pack it in any kind of a tub that will carry it to market, and get the best p for it they can. A great deal of this butter soon becomes rancid, and is a erable grease, unfit for anybody to eat. It is sold at comparatively low pr and hundreds of thousands of dollars are thus annually thrown away. It is hard to remedy the evil on the old system of private dairies, since the far will tell you it wont pay to build a spring room and hire a skillful butter for a few tubs of butter, spring and fall; and even should he go to extra e and care, it is not certain that the butter would sell any higher. The wiv daughters have more labor than they can attend to, without slaving over butter making, and so a great deal of poor butter goes to market.

'he ciated dairies have the means of remedying this defect, in the estab- ; of butter factories in connexion with cheese manufacture. Butter t at factories is of recent origin. It was inaugurated in Orange county, w York, about four years ago, and, in connexion with the manufacture of m k cheese, has proved a success. A number of factories have been put o ation in that county, and the system, it is believed, will be adopted to extent throughout the whole dairy region.

r the system can be gradually introduced and managed judiciously, it will ve a source of profit to the producer and a great blessing to consumers. ere is danger, however, that too many in the cheese producing counties may thoughtlessly into the manufacture of skim cheese, and thus, by over- tion of both butter and a poor character of cheese, make the whole thing ure—that is, render it unprofitable. How far markets may be opened for o osal of skim cheese remains to be seen; but it is evident that the great t of American cheese must be made of whole milk, or at least of milk that een but lightly skimmed.

Dr. Voeclker's analysis of the best samples of English and American cheese s that ours is about 2½ per cent. richer in butter than the English samples, atter containing more moisture. Whether, therefore, we may be able to re a portion of the cream and yet manufacture a nice, palatable cheese, to the best English cheddar, is for future experiments and skill in cheese to determine.

It is believed that as we progress in the science, great improvements will be e in this direction, and a superior quality of cheese be made from milk not ly rich in butter; but until the facts are fully established, and the pro- s of manufacture generally understood, there is danger of butter factories ting the standard of American cheese, by throwing upon the market a of the poorer grades. Though in favor of butter factories, and fully in the that the public necessities demand them, in limited numbers, and that the m is an advanced step in dairy progress, there is necessity for caution, that y not overdo the work and "get too much of a good thing" at once.

This danger of an excess of butter and skim cheese factories will be more rent when the comparative profits of the two systems, at present prices, are into account.

In November, 1865, when in Orange county, I was told by Mr. Allison, su- endent of one of the factories, who had kept a record of work, that the product during the season, up to October, from fourteen quarts of milk, measure, was one pound of butter and two of skim cheese. The cheese ies do not produce more than three pounds of cheese from the same quan- of milk. Now the average sale of factory cheese the past season (1865) has only a little over 15 cents—call it 16 cents—and we have 48 cents as the of the milk by that system. But by the other system, the average prices which butter was sold in the fall would nearly cover that amount, leaving the o pounds of skim cheese as clear gain. These are the facts which serve as a or estimating the relative profits of the two systems. We may assume a given quantity of milk will yield an equal weight of product by either but in one a third of the weight is in butter. To be exact, I suppose by the Orange county system the milk is worked up more perfectly, or with e, and hence there is really a larger product by that system; but as makers claim to be able to work milk without much waste, the ea not be named here. The cost of manufacturing butter and cheese slightly in advance of manufacturing cheese alone, but the differ- e is not so great as to be of much account.

It will be seen, then, that the success of butter and cheese factories will de- upon the prices by which butter is to rule in the market above that of

cheese, and the facility in disposing of skim cheese. Last fall the Orange county factories sold their butter at 70 cents, and their skim cheese at prices sli y in advance of whole milk cheese from the best factories of Herkimer and On But such a condition of things may never occur again, and it would not be or safe to make these figures a basis for future operations.

The dairy region has been trying to make a finely flavored, high-priced cl such as will sell in the markets of Great Britain along with improved E cheddar, at 84 to 112 shillings per hundred—that is, from 20 to 25 cents in gold. Some of our factories, during the last two years, have come up to the required standard, and American cheese now stands equal to any manufactured in the world. I am in receipt of a letter from the London agent of one of the oldest and largest cheese dealers in Great Britain, saying that he had just sold, at wholesale, December 23, 1865, some of the Oneida fancy factory make at 84 shillings. That is not bad; and when we can prove to our English customers that we are able to supply them with the best cheese, they will take of us from fifty to one hundred millions of pounds annually and pay us well for it. But we must not get back on a poor grade, and lose the reputation we have labored so hard to obtain. These points should enter properly into the consideration of this subject, with those contemplating a change to butter and skim che manufacture.

The advantages of butter making on the associated dairy system over of private families are very great. In the first plan a uniform product of sup character is secured. Every appliance that science, or skill, or close attention to business is able to obtain is brought to bear upon the manufacture, and prime quality necessarily follows as a result. If you could assume that, in a neighborhood of one hundred families, each was possessed of the skill and conveniences of the factories, and that each would give the subject the same close attention, there doubtless would be no difference as to quality of product; but such a state of things rarely exists.

Again, the factories are able to obtain a larger price, because it costs the dealer no more to purchase of the one hundred dairies combined, than it would of an individual dairy, and the uniformity and reliability of the product does not entail the losses that are constantly accruing in different lots on account of inferior quality. The factories, too, relieve the farmer and his family from a great deal of drudgery, and unless the work is to be done by members of the family who cannot be employed profitably at other labor, it is a matter of economy to have the butter or cheese made at the factory; since what would employ a hundred hands scattered over the country, is performed in the same time by three or four when the milk is worked up together at one place.

The only serious complaint against the factory system is in hauling the milk. This has been obviated, in many instances, by establishing a route of milk teams, where the milk is delivered for the season by the payment of a small sum. The associated system, applied to butter making, has all the advantages, and will do as much for the improvement of butter as it has for cheese; and no one at this day will deny that in the latter it has brought about a wonderful improvement. The butter making department can be easily applied to cheese factories. There need be scarcely any alteration in the buildings. A spring room, cheese room, and butter cellar must be added, but these need be but small and cheap structures. The spring room is to be provided with vats or tanks for holding the water. They should be sunk in the earth in order to secure a lower and more even temperature of the water, as well as for convenience in handling milk. The vats should be about 6 feet wide, and from 12 to 24 feet long, arranged for a depth of 18 inches of water. There should be a constant flow of water in and out of the vats, so as to secure a uniform temperature of the milk after it has been divested of its animal heat. The milk is set in tin pails, 8 inches in diam-

er by 20 inches long, each holding about 15 quarts of milk. As fast as the ilk is delivered, the pails are filled to the depth of 17 inches and plunged into water, care being taken that the water comes up even with or a little above surface of the milk in the pails. The temperature of the water should be om 48° to 56°.

A vat holding about 2,000 quarts of milk should have sufficient flow of water divest the milk of its animal heat in less than an hour. Good pure milk will p sweet 36 hours when thus put in the vat, even in the hottest weather.

When milk is kept 36 hours in the water, nearly all the cream will rise. Some that it all rises in 24 hours or less. The time may be varied, according quality of cheese it is desired to make. That being determined, the pails en out, the cream dipped off with a funnel-shaped cup, having a long up- t nandle. The milk then goes to the cheese vats for making skim cheese, cream is either churned sweet or is placed in the pails and returned to vater, where it is kept until it sours. Sour cream makes the most butter, sweet that of the nicest flavor. When the milk is churned sweet, the but- k may be put into the vats with the milk for making skim cheese, and ace there will be no loss.

The old notion that cream cannot rise through a depth of milk greater than n inches, it is believed, is an error. The Orange county farmers say they get as much cream by setting in pails on the above plan, as they can to set milk shallower in pans, and the cream is of better quality, because a small ace being exposed to the air, there is not that liability for the top of the o get dry, which has a tendency to fleck the butter and injure its quality. esiring to test this matter, I took glass cream jars, on which were graduated s, and set milk of the same quality at different depths, from two to eighteen s. The depth of the cream was always in proportion to the quantity of the . Mr. Jones, of Utica, the inventor of the floating thermometer and a new yarometer for testing milk, also tried the experiment, and the same result invaly followed. Hence I conclude the Orange county butter makers are right.

The great secret in butter making, it seems, consists in attending to the fol- points: 1st, securing rich, clean, healthy milk—milk obtained on rich old s, free of weeds; 2d, setting the milk in a moist, untainted atmosphere, keeping it at an even temperature while the cream is rising; 3d, proper nt in churning; 4th, washing out the buttermilk thoroughly, and work- so as not to injure the grain; 5th, thorough and even incorporation of the and packing in oaken tubs, tight, clean, and well made. Cleanliness in all perations is of imperative necessity. Judgment and experience in manipu- ing the cream and working the butter must of course be had.

the butter department is to be added to cheese factories already built, t a third of the cost will be in pails, two of which are required for every cow which milk is delivered. To build a butter and cheese factory combined, apacity for 400 cows, fitted up with the necessary machinery complete, the s estimated at ten dollars per cow. It will hardly pay to build and run a ry for less than three hundred cows, and it is not desirable to have the of cows above a thousand.

the working of any new system, practical men always desire statistics of I have seen the statement of receipts and expenditures of the Wallkill , Orange county, for the year 1865. The quantity of milk received from 1 to December 1 was 627,174 quarts, of which 27,308 were sold at a little e seven cents per quart, leaving 599,866 quarts to be made up into butter . The product was as follows: 31,630 pounds of butter, 81,778 s of skim cheese, 5,908 pounds of whole milk cheese, 2,261 quarts of sold at 19 6-10 cents per quart, and 1,561 quarts of skim milk, at 1$\frac{5}{8}$ per quart.

The net cash receipts, after deducting transportation and commissions, were as follows:

For pure milk sold	$1,926 22
skim milk	24 02
butter	13,344 21
skim cheese	11,659 08
whole milk cheese	1,065 44
2,261 quarts cream	443 33
hogs fed upon whey	446 24
buttermilk and sundries	207 49
Making a total of	29,116 03

The expense account was as follows:

For labor	$1,476 40
fuel	79 96
cheese boxes	653 17
20 sacks salt	89 25
rennet, bandage, &c	483 55
carting cheese	273 10
hogs	179 90
	3,235 33

This gives an aggregate net receipt of $25, 880 70.

From these statements it appears that the butter averaged 42¼ cents per pound, the skim cheese 14¼ cents, and the wholemilk cheese 18 cents per pound, while the average amount received on the whole quantity of milk was $4\frac{1}{10}$ cents per quart. The expenses of the factory were a little over half a cent per quart.

From a recent report of average sales of cheese from the New York and Ohio factories, it appears that 15½ cents per pound is all that has been obtained by a majority of the best wholemilk cheese factories during the year 1865, and the comparative profits may be thus stated:

Fourteen quarts of milk, making 3 pounds of cheese, (at 15½ cts.,) 46½ deduct cost of manufacturing, boxes, &c., 6 cents—leaving 40½ cents.

At the butter and skim cheese factory, 14 quarts of milk, at $4\frac{1}{10}$ cents per quart, amount to $57\frac{2}{5}$ cents; deduct cost of manufacturing, &c., 7 cents, and we have a difference of 10 cents in favor of the butter and skim cheese on every 14 quarts of milk.

It may be asked how do the butter and skim milk factories compare with those dairies where butter alone is manufactured from the milk. I have no statistics from dairies in Orange county showing the quantity of milk for a pound of butter, but was told that by the factory system of taking off part of the cream and working up the skim milk, greater profits were realized.

The Hon. Zadock Pratt, in the account given of his butter dairy in Greene county, gives the average quantity of milk required for a pound of butter, during the season of 1860, to be $11\frac{20}{100}$ quarts, and in 1861, $10\frac{42}{100}$ quarts. In 1859 it took $14\frac{50}{100}$ quarts, and in 1858, $16\frac{16}{100}$ quarts for one pound of butter. The milk in this dairy is set shallow in pans and the cream skimmed off after the milk has soured and begins to thicken. At the Orange county factories it is not desired to take all the cream from the milk, since a portion of it is needed in the skim cheese.

vhich is taken off is fresh and sweet, and is in condition to make the vored butter. The management of the milk is without doubt the best yet been discovered, and should be generally adopted whenever good sought after.

ıurning and working of the butter does not differ materially at the facm that of other experienced manufacturers. The cream is churned in ɜl and a half dash churn, and the butter worked with a lever upon an ɜlab. The whole system commends itself to the dairy public, especially tter districts, and if the cheese makers would adopt it at their factories ıg spring, fall, and winter butter, large sums would be annually saved, public greatly benefited by being able to secure readily a desirable

DAIRY PRODUCTS OF THE UNITED STATES.

·llowing tables give the number of pounds of butter and cheese made nt sections of the Union, according to the census returns of 1850 and 'he total production of butter in the United States and Territories in ; 313,345,306 pounds, and in 1860, 469,681,372 pounds. Of cheese, ıct in 1850 was 105,535,893 pounds, and in 1860, 103,663,927 pounds, an increase in the production of butter and a decrease in cheese during de. From the tables it will be seen which States are largely interested anch of industry:

Amount of butter and cheese made in 1860 *and* 1850.

States.	Butter.		Cheese.	
	1860.	1850.	1860.	1850.
GLAND STATES.				
ut	7,620,912	6,498,119	3,898,411	5,363,277
....	11,687,781	9,243,811	1,799,862	2,434,454
setts	8,297,936	8,071,370	5,294,090	7,088,142
shire	6,956,764	6,977,056	2,232,092	3,196,563
d	10,211,767	995,670	181,511	316,508
....	15,900,359	12,137,980	8,215,030	8,720,834
al	60,675,519	52,924,006	21,620,996	27,119,778
LE STATES.				
:...............	103,097,280	79,766,094	48,548,289	49,741,413
nia	58,653,511	39,878,418	2,508,556	2,505,034
ey	10,714,447	9,487,210	182,172	365,756
....	1,430,502	1,055,308	6,579	3,187
....	5,265,295	3,806,160	8,342	3,975
f Columbia	18,835	14,872	....	1,500
l	179,179,870	134,008,062	51,253,938	52,620,865

Amount of butter and cheese made in 1860 *and* 1850.—**Continued.**

States.	Butter.		Cheese.	
	1860.	1850.	1860.	1850.
WESTERN STATES.				
Indiana	18,306,651	12,881,535	605,795	624,[illegible]
Illinois	28,052,551	12,526,543	1,848,557	1,278,[illegible]
Iowa	11,953,666	2,171,188	918,635	209,[illegible]
Michigan	15,503,482	7,065,878	1,641,897	1,011,[illegible]
Minnesota	2,957,673	1,100	199,314	....
Missouri	12,704,837	7,834,359	259,633	203,572
Ohio	48,543,162	34,449,379	21,618,893	20,819,542
Kentucky	11,716,609	9,947,523	190,400	213,954
Wisconsin	13,611,328	3,633,750	1,104,300	400,283
Kansas	1,093,497	....	29,045	....
Nebraska	343,541	....	12,342	....
Total	164,786,997	90,511,255	28,428,811	24,761,472
SOUTHERN STATES.				
Alabama	6,028,478	4,008,811	15,923	31,412
Arkansas	4,067,556	1,854,239	16,810	30,088
Florida	408,855	371,498	5,280	18,015
Georgia	5,439,765	4,640,559	15,587	46,976
Mississippi	5,006,610	4,346,234	4,427	21,191
Louisiana	1,444,743	683,069	6,153	1,957
North Carolina	4,735,495	4,746,290	51,119	95,921
South Carolina	3,777,934	2,981,850	1,543	4,970
Tennessee	10,017,787	8,139,583	133,575	177,[illegible]
Texas	5,850,583	2,344,900	275,128	95
Virginia	13,464,722	11,089,359	280,852	436
Total	60,242,258	45,206,392	808,397	959,802
PACIFIC STATES AND TERRITORIES.				
California	3,095,035	705	1,343,689	150
Oregon	1,000,157	211,464	105,379	36,980
New Mexico	13,259	111	37,240	5,848
Washington	153,092	....	12,146	....
Utah	316,046	83,309	53,331	30,998
Total	4,577,589	295,589	1,551,785	73,976

We have not the exact figures at hand for giving the statistics of butter and cheese made in the Union during the year 1865, but the production of cheese in the middle and western States alone, it is believed, was more than 200,000,000 of pounds. From facts gathered by the American Dairymen's Association, it is known that there are now upward of a thousand cheese factories in operation throughout the United States. If the number of cows to each be estimated at 500, we have half a million of cows employed in the associated dairies, and if the average annual yield per cow be put at 300 pounds, we have in the aggregate 150,000,000 pounds. But there are a large number of private or family dairies in operation, especially in the eastern and middle States, the production of which, it is believed, will more than make up the estimated annual product of cheese to 200,000,000 pounds.

value of the cheese product of 1865 be put at an average of 15 cents l, it shows a total of $30,000,000, while the butter product, if no larger of 1860, at the low estimate of 25 cents per pound, would amount to 4,000,000. In the estimate of the cheese product it will be proper to hat the quantity is presumed to be the amount sold, and does not ıat consumed in the families of producers.

EXPORTS OF CHEESE AND BUTTER.

atistics of the trade show that the dairy products of the country are an important branch of commerce.

llowing table gives the quantity of butter and cheese exported from for a series of years:

	Butter.	Cheese.
		5, 098, 000
	2, 494, 000	9, 287, 000
	10, 987, 000	23, 252, 000
	21, 865, 000	40, 041, 000
	29, 241, 000	38, 722, 000
	23, 060, 793	40, 781, 168
	14, 174, 861	49, 755, 842
		43, 101, 000

crease in the cheese exports of 1865 from those of the year previous, rom an extraordinary home demand, which took large quantities of a price in advance of what shippers felt warranted to pay for it to The shipments abroad have been mostly to Great Britain.

exportation for a number of years has been kept up with the West d with South America, the trade with the latter being for the most part er grade of cheese made from skimmed milk. Recently this character has found a favorite reception in China, where parcels have been sent ıge for tea.

elieved there is a wide range of markets yet unopened for the disposal can cheese, needing only a little enterprise on the part of dealers for its ion; and that when once introduced, it will increase steadily until a eign demand is reached.

Britain alone can now take considerably more than our surplus, and qualities of adaptation of styles to her needs meets, year by year, greater time cannot be far distant when America will be regarded, if she be ly, the great cheese producing country of the world.

DAIRY FARMING,

WITH SOME ACCOUNT OF THE FARM OF THE WRITER.

BY ZADOCK PRATT, PRATTSVILLE, GREENE COUNTY, NEW YORK.

This article is not designed to describe the methods of dairy farming which are successfully practiced by the writer. In the Patent Office Report (agricultural) for 1861, the reader will find a very full and minute account of the Prattsville dairy and the method of butter making practiced there, to which, for the better understanding of the statistics appended to this article, his attention is directed. My object here is rather to show the results of dairy farming for seven successive years, as ascertained by a careful and systematic method of keeping an account of all the products of the farm—the expenses incurred, deducing therefrom the net profits of cultivating it. By doing this, I hope to encourage my brother farmers to manage their farms more intelligently, and by ascertaining the net profits of wool growing, dairy farming, stock breeding, or the culture of particular grains or grasses, to learn whether their labors meet with the proper reward.

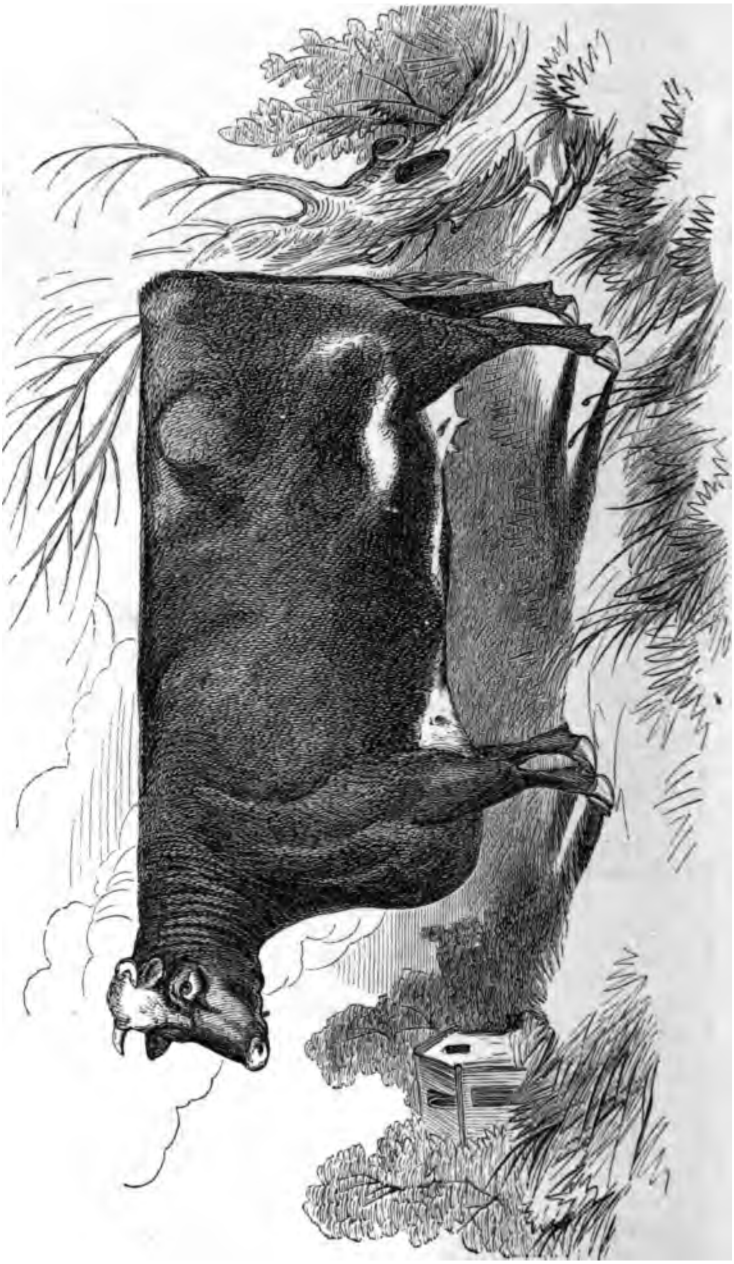
In the article referred to above it was remarked that butter making in this country has been most successfully carried on within that belt of territory, varying from twenty-five to fifty miles in width, which begins with Orange county, near the city of New York, and extends from the Hudson river in a northwesterly direction perhaps one hundred or one hundred and fifty miles into the heart of the State of New York. Within this belt lies the town of Prattsville, situated in the northwest corner of Greene county, adjoining Delaware county; and this town and the adjoining town of Ashland may be fairly called the butter making region of Greene county.

In 1824, when the writer first located here and began to build his tannery, which afterward turned out a million sides of sole leather, all this region was a dense forest of hemlock, which yielded to the tannery one hundred and fifty thousand cords of bark. After the hemlock forests were cleared away and the tannery was removed to another locality where hemlock was nearer at hand, the writer, who, like many old tanners, had a regard for hemlock lands, felt confident that these lands would prove good for butter making, and at once turned his attention to the subject. The success which has attended his enterprise is best shown in the statistics below. It will be seen from these tables that order, regularity, attention, "minding your business," are essential to butter making, as they are to success in any department of farming. To this may be added a good thick sod, which hemlock lands afford, and an abundant supply of pure, soft, cool water.

The farm, as heretofore referred to in the report for 1861, contains 365 acres, 40 of which are fine alluvial soil. The residue is hemlock land, the soil of which is loam and gravel, and lies on the eastern slope of the Catskill mountain. The average number of cows kept on the farm was eighty, though at one time the number was one hundred. The average quantity of butter for each of sixty-four cows in 1862, as will be seen by a reference to the table, was 223 pounds. The present season this very high average has been a little exceeded; but as the number of cows has been increased to eighty, the large product which they average is still more remarkable.

From the accounts, which have always been kept with accuracy, of the management, products, and expenses of this farm, a summary in the most concise form possible is presented in the following tables:

PLATE XXV.



MILK.

	1857.		1858.		1859.		1860.		1861.		1862.		1863.	
	In lbs.	In gals.	In lbs.	In gals.	In lbs.	In gals.	In lbs.	In gals.	In lbs.	In gals.	In lbs.	In gals.	In lbs.	In gals.
Whole product	251.736.	31,842	260 450	32,556¼	240,700	30,087	217.736	26,276	227,757	28,301	282,353	35,740	36,287.1	46,731
Average per cow	5,091.48	636.31	5,209	651.12	4,814	601.74	4,354.75	525¼	4,555	572.26	4,411	558.43	4,535	584
Average per day	1,041	130.50	1,067.50	133.4	982.50	122.67	888.72	107.28	870	108.85	1,085	137.4	1,343	173
Average per day for each cow	20.80	2.60	21.30	2.70	19.65	2.45	17.77	2.14	17.5	2.17	16.9	2.14	16.7	2.1
Greatest av'age in one day per cow	24.18	3.25	31.50	3.31	28.35	3.53	25.60	3.40	26.7	3.34	23.3	3.2	25.2	3.2

BUTTER.

	1857.	1858.	1859.	1860.	1861.	1862.	1863.
Whole product	6 500 pounds	8,050 pounds	8,300 pounds.	9,143 pounds	10.860 pounds	14,274 pounds	17,976 pounds
Average per cow	130 pounds	161 pounds	166 pounds	182.86 pounds	217.20 pounds	223 pounds	224 7-10 pounds
Average per day	26.61 pounds	33 pounds	33.92 pounds	37.32 pounds	41.76 pounds	54.9 pounds	66¼ pounds
Average per day per cow	8.50 ounces	10.56 ounces	10 84 ounces	11.94 ounces	13.36 ounces	13.71 ounces	13 3-10 ounces
Average milk to one pound butter	39.20 lbs. or 20 qts.	32.33 lbs. or 16.16 qts.	29 lbs. or 14.50 qts.	23.30 lbs. or 11.20 qts.	21 lbs. or 10.42 qts.	19.7 lbs. or 10.1 qts.	20.1 lbs. or 10.3 qts.

PORK.

	Per cow.	Total.	Per cow.	Total.	Per cow	Total.	Per cow.	Total.	Per cow.	Total.	Per cow.	Total.	Per cow.	Total.
Pork made, in pounds	92.5	4,627	148	7,403	129	6,455	130.3	6,516	132.5	6,625	144	9,318	129	10,389

SALES.

Butter sold	$30 95	$1,547 54	$38 48	$1,924 02	$41 40	$2,070 00	$42 97	$2,148 89	$49 91	$2,497 80	$57 98	$3,711 24	$60 66	$4,853 52
Pork sold	6 56	328 16	8 42	421 08	8 36	418 00	9 12	456 12	6 62	331 25	7 28	465 90	7 14	571 39
Calves sold	....	....	....	....	....	....	....	80 00	....	38 65	....	146 55	....	195 94
Total	37 51	1,875 70	46 90	2,345 10	49 76	2,488 00	52 09	2,685 01	56 49	2,867 70	65 26	4,323 69	67 80	5,620 85
Expenses for working farm over proceeds of same, not enumerated above, including $700 for each year, for interest on investment for farm and stock, $10,000.	....	1,415 50	....	1,380 50	....	1,550 00	....	1,125 75	....	1,150 75	....	1,526 77	....	1,916 45
Net profits above interest	....	460 20	....	964 60	....	938 00	....	1,559 26	....	1,716 95	....	2,996 92	....	3,704 40

Amount realized for each cow: For butter sold..... $60 66
For pork sold...... 7 14
67 80

Other products: 1,107 bushels corn in the ear from 8½ acres.
1,500 bushels carrots and beets.
130 loads of pumpkins.
80 tons hay.

Other products: 100 bushels oats.
Value of honey sold and on hand... $54 16
Value of new hives of bees' increase. 74 00

BEE KEEPING.

BY MRS. ELLEN S. TUPPER, BRIGHTON, IOWA.

Bees, from the earliest ages of the world, have been invested with pe interest, and have claimed the attention not only of the unlearned and igno but of the student and naturalist. The mystery which so long enveloped t and their habits added not a little to the zest with which their history was vestigated.

The discoveries of the last twenty years, however, have so elucidated th laws of bee instinct, that no important point is longer a subject of contro or mystery; and in the light now thrown upon the subject no branch of r economy can be more definitely regulated, or conducted with such absolute c tainty of success.

The management of bees can only be successful when conducted with a fect understanding of their natural history, and in accordance with the in which govern them. In the words of one of the most eminent apiarian country, "The business may be viewed, first, as a science having for its ob the attainment of a correct knowledge of all that pertains to the life, habits, instincts of the honey bee; and, secondly, as a practical art, which rega the attainments thus made, and to be made, as the only reliable foundation successful management." The laws which govern these wonderful little ins are peculiar to themselves, differing from those which govern everything They are simple, and one can manage them in almost any way so long a does not go counter to their instincts; but they are fixed and immutable, when we deviate from them in the smallest particular loss must follow. T successful, then, in the practical art, the science on which it is founded mus thoroughly understood.

All these laws have been so fully and clearly explained in various able w on the subject that to enter on them here would be superfluous; this p therefore, will treat only of the practical, and aim to give direction and a as to the management of bees, in such a way that they shall every year, w ever be the season, yield a profit to their owner.

I shall recommend nothing that I have not fully tested, and give no which I have not myself followed with profit. The business requires but capital, and so little strength that it may be made an agreeable recreatio the man of toil, and a most remunerative employment for invalids. There i part of the work required which is not suitable for women; and now, w many are looking for new avenues of female labor, I would that I could some to find health and pecuniary profit in this business. In almost every of the United States honey-producing plants abound; no other country world is so rich in them, and yet this great source of wealth is comp undeveloped.

By the official report of the Department of the Interior, it appears that was produced in 1860, in the whole United States, only 23,306,357 po of honey, which is about half the amount of maple sugar produced the year. For the same year the little kingdom of Denmark produced 4, pounds of honey. The island of Corsica paid, for many years, an annual of 200,000 pounds of wax—which presupposes the production of from two

illion pounds of honey. The island contains only 20,200 square miles. province of Attica, in Greece, containing only 45 square miles and inhabitants, 20,000 hives were kept, and an average obtained from f thirty pounds of honey and two pounds of wax. East Friesland, a ce of Holland, containing 1,200 square miles, maintained for twenty in average of 2,000 colonies to the square mile.

ention these facts here to show what is done with bees in different parts ope. Now, if these results can be obtained there, what may not be done our rich plants, by a system of intelligent bee culture. No part of the is more rich in honey (excepting, perhaps, California) than Iowa, and yet n 1865, were found but 87,118 hives of bees, or little more than 1½ to square mile. These hives yielded only 1,117,833 pounds of honey and r about 13¼ pounds average to each hive. In view of facts like these, mportant to encourage, in every possible way, the increase of bees, culate facts regarding their intelligent culture.

HIVES.

fifty years Yankee ingenuity was busy in the construction of hives which secure marvellous yields of honey and increase of bees. The idea was nt something which should do the work for them. All such inventions eir name is legion) proved failures, as might have been expected, since it ed fact that bees will gather and store just as much honey in an old hol- or an old barrel, *while all is right with them*, as in any hive of any The object, then, in having anything else for them is not to aid the bees g honey or raising a brood, but to assist the owner in getting the surplus n the best form, without injuring the bees, and also to give him the con- the interior of the hive, so that he can tell what is wrong, and apply the . From the time of Huber such an invention has been thought desirable, s not until our day that such a one was made.

rzon, of Germany, in 1838, invented a hive in which the combs were made ars, and which were intended to give control of the combs; but they were erfect in their construction for general use. In 1852 Rev. Mr. Lang- patented a hive, in which each comb was to be made on a movable frame could readily be lifted out at pleasure, and thus a new era in bee keeping mmenced. There is nothing in these hives which is intended to perform or of the bees or their keeper. They are simply aids to the work. The vantage which they possess is the command which they give of every placing it in your power to know certainly the condition of your bees.

common hives it is easy to tell when your bees are prosperous and all . It is equally easy to tell when something is wrong, but not so easy to what that something is. You may perceive that the bees decrease, and t t they have lost their queen; or notice that they work with less i think possibly (as is often the case) that they have too much honey n combs where the young should be. But there is no way to ascertain posi- often before you decide the matter it is decided for you by the colony worthless. In the movable-comb hive it is your own fault if you do not ively all the time that there is no trouble. If a hive is queenless it e d by examining the combs, where the presence or absence of s the matter. In this case another queen, or the egg from which one, c be at once provided. If too much honey has by some accident d in the centre combs, one or more can be exchanged for empty ones, que will gladly fill with eggs to replenish the hives.

me say that this trouble I find to be one of quite common oc- ng a plentiful yield of honey the bees, in their eagerness to store as queen for room in which to deposit her eggs. I have often seen

this in movable-comb hives, where the remedy can be applied in a moment. is only one proof among many that it is not always safe to trust to the i of bees any more than that of any other animals.

Another advantage of these hives is the facility with which drone com be removed, or its building prevented. One who has not examined the would be slow to believe how much honey is needlessly consumed ever in drone raising. Here, again, the bee instinct falls far short of reason. bees live wild, in isolated situations, the rearing of many drones no doub duces to the safety of the young queens; yet a preponderance of drone is, I am convinced, partly accidental. Late in the season, if honey is very a ant, and little brood being then raised, many colonies construct drone co enable them to store faster than they can do in the worker combs. The spring they do not, of course, tear it down and build others, and, being the queen deposits her eggs in it, and drones are thus reared. It is also well l that colonies, while queenless from any cause, build drone combs, if they any, and in the hives of such colonies there is a surplus for the next year. if a hundred hives are kept together, and drones are raised in one or two of it is enough for all. Therefore, it is easy to see the economy of a hive in drone raising can be restricted at will, and the honey used in raising and wards in feeding them be saved. I say "*restricted*," for I have never it best to leave any hive entirely without drone comb. It is better to l few inches in some central comb in every hive; otherwise, at the swarm son, they will lengthen out the worker cells and raise some drones. If the room for a few it seems to satisfy them.

Again, the prosperity of a colony depends much on the age of the All must have perceived the difference in prosperity of swarms side by s the same kind of hives and in the same location; one will vigorously i and store up honey, while the other barely lives. In many cases this is by the difference in the age of the queen, as any one will ascertain who the trouble to mark the hives containing young queens. After the secon the queen is far less prolific, and then much is gained by removing her, w easily done in these hives. It is objected by some that this is "unnatural I would ask, is it any more so than to kill a hen after she is too old to many eggs, or to shear a sheep, or break a colt? Why may we not us contrary to their nature as well as domestic animals?

The strengthening of weak swarms is also facilitated by these hives. colonies will always be found where many bees are kept, and by the aid o frames they may be built up into strong and vigorous ones; honey, bee and young bees being taken from a stand well able to spare it, and gi those perishing from the want of it. In this way many worthless s have been converted into excellent colonies. In the fall all such weak s may be united with strong ones, which are improved by the addition. spring the same thing can be done, and your hives kept always equalize strong. Old or soiled comb can also be taken away when you please. pruning of old comb, which is practiced by many every year, is in most unnecessary. So long as it is free from mould, it is good to store hone rear brood in. I invariably find, all other things being equal, that bees better in old comb than in new. Bees have been kept in the same comb years in succession, doing as well the last year as the first. When the honey in building new combs is considered, the advantage of hives in whi can save all good pieces is very apparent.

It is not necessary to have these frames in a complicated hive; nor i mending them do I mean to indorse the *hundred and one* traps for the ig which in many hives are added to them. You need no slides, nor hing moth traps, nor patent ventilators, nor non-swarmers. These are not on , but most of them injurious to the bees. Neither would I ever k

hive where the bottom board was fastened to it. On this point I am aware I am at issue with many successful bee keepers. But for my use I want e which can be raised at any time, and the bottom cleanly swept. A plain box, well made of seasoned boards, in which the frames can be hung, is all really necessary. Any amount of extra outside finish may be added, .t always pays to have hives well painted.

SIZE AND SHAPE OF HIVES.

iere is much difference of opinion among bee keepers on these points; and rises, I think, from the different ways in which bees are wintered. About square inches inside is, by exact computation, as much as can be filled by a with brood, and allow room for bee-bread and honey for present use. In l, as the brood hatches, the empty comb is filled with honey, and this size iamits of room for sufficient winter stores in any season. I once thought nuch less than this would winter a colony; but one season, when we had ly frost succeeded by a late spring, and my bees gathered no honey for months, I am sure that the size of my hives alone saved many colonies, had not a pound to spare in May.

uttle too much is no disadvantage, for the more they have on hand in the t earlier and faster do they rear young bees. The form of the hive is bject at issue than the size. I use one eighteen inches in length by n inches in width, and ten inches deep. It is constructed with an en- at each end, and as the honey boxes project over these entrances, I have 'or eight boxes on the top, capable of containing six pounds of honey . These boxes can be raised in the height of the storing season, and eight be put under them; and all being near the main apartment, and easy of , I often have colonies filling sixteen boxes at the same time. This room ooxes on top I consider an important feature in any hive, for bees often ı idle simply from want of room to labor in. I do not think there is other form so good as this, where bees are wintered in a house, or in a cel- or when they are buried; but if bee keepers will leave their bees on their stands all winter, I think a taller shape of hive will be found preferable. naturally cluster *below* their stores, and the heat of the hive then ascends tne honey is, and it is free from frost when the bees go up to get it. In low form, they are compelled to cluster at the sides of the hive, and in severe weather, the honey is always cold. I have seen whole colonies n these hives, leaving an abundance of honey. They simply could not get without freezing. In the instances of this kind which have come under my too much draught had been allowed in the hive, by having the entrance below and the holes open on the top. To winter safely out of doors in hallow hive, the entrance should be closed so as to admit of the passage of one bee at a time, and the *cap* should be filled with straw or corncobs to all moisture, and but one hole be left open. Winter passages, as they alled, should be made. These are holes an inch in diameter, two or three from the top, made in each comb. Through these the bees can pass ut being obliged to go over and under the frosty combs, to reach their s. With all precaution, however, I cannot recommend the shallow hive as ble for unprotected wintering. The taller hive, with frames to correspond, ıı be found much less convenient where combs are to be lifted out and ex- ined. In proportion to the depth, the danger of breaking down and the diffi- of lifting out increases; still, if obliged to winter bees out of doors, I adopt it. I have found little trouble in making bees build straight combs. y say I have had none, for since the first season I have had no crooked s. The triangular guides regulate them usually, but if straight-worked can be obtained and pieces fastened in a few frames of each hive, it will

aid them. After one has a few hives filled with straight comb, so that frame can be given to each new colony, there will be no further trouble, if be taken. There will be uneven places, or pieces of comb made thick; should be cut down and regulated as soon as perceived—using a knife dip in hot water for that purpose. It must be borne in mind that it is not to have the combs so straight that they can be taken with care out of their hive and replaced there; to reap the full advantage of the movable combs, eve one must be straight enough to fit in any place in any hive. For this also, whatever form of movable comb is used, they should all be alike; every frame should fit every hive. One who has never tried it cannot ima trouble connected with the management of fifty or one hundred hives of dine sizes and forms.

The matter of size, shape, and model should be decided with due care, a after bees are put into some of them no changes should be made, even if the seem to be for the better. I would not be understood as advising any one make or use any form of movable-comb hive without buying a "patent right "The laborer is worthy of his hire;" and when a lifetime has been spent bringing to perfection so valuable an invention as this, all the better for its plicity, the inventor has a right to his reward.

No one should attempt to make a hive without a model, unless he has sufficient experience in bee keeping to enable him to know just what he w In every case they should be well made. The first dozen movable-comb which I used I came near discarding, simply, as I now know, because they were so badly made, of unseasoned lumber, that no part fitted as it should.

WINTERING BEES.

Bees are natives of warm climates and their instincts are given them for t protection there. When kept where the winters are severe, or where they variable with periods of extreme cold, they should be protected in some wa Bees cluster compactly together in winter, and thus maintain their proper perature. It requires numbers to do this—a small cluster cannot keep requisite heat for safety, they therefore freeze. If a thermometer be thr the centre of a colony of bees of a proper size, on the coldest day of win mercury will rise to summer heat. The bees are constantly changing, tn the centre moving outwards and the others taking their places. If a bee, n cold day, gets away from the cluster it is chilled and cannot return. In coldest weather they remain in a semi-torpid state, and use but little honey. a swarm is large enough, it cannot perish from cold, but many starve w plenty of honey in the hive, if it is located where they cannot reach it. more are destroyed every season by the moisture of the hive which acc in the warm days, and which, by a sudden change of weather, is turned u in the entrances, thus shutting out the air.

I consider the requisites to successful wintering in the open air to be, ab stores, with winter passages through the combs, a large colony of bees, and ward ventilation secured without a draught of cold air passing through the

Under any circumstances it has been proved that bees consume much less honey when protected in winter. A hive weighing 60 pounds in the fall of 1863, wintered out of doors, weighed only 15 pounds the 1st of April, twenty kept in the cellar the same three months lost on an average only pounds each. Again, six hives wintered out of doors lost an average of pounds each in three months, while twenty in the cellar the same length of lost an average of only 5¾ pounds. Figures like these show clearly pays to protect bees in winter.

The time of year when bees consume the most honey is in the spring month while raising brood fast. The more honey they have on hand in March and

ril, the faster they will rear young bees, and the more workers will be ready
ner the harvest from fruit blossoms. The bee keeper who leaves his
y what honey they can consume, being satisfied if they barely "live"
;n the winter, is as foolish as the farmer who allows the team on which
s for a summer's work to be poor in the spring and short of feed. To
se n's work in good shape, a colony should have plenty of old honey on
intil swarming time. To secure this end, leave from thirty to fifty pounds
i hive in the fall, and then protect them in some way.

nave wintered mine very successfully for six winters in a dry and moderately
cellar, where the thermometer usually is about 30° above the freezing
Here they are perfectly quiet, not a sound comes from them; they seem
n torpid. I try not to keep them there over three months, but the want
proper day in which to put them out has obliged me *twice* to keep them in
months, and no bad results followed. Where many hives are kept, the
y saved in one winter will pay the expense of a house to keep them in, if
od cellar is at hand. Such a house should be dark and tight, and the bees
ed on shelves one above another.

warm still day should be selected in which to put them out again in spring.
are very careful to place them just where they stood before, but this is
important. When leaving the hive for their first flight every bee marks
cation, and if they do remember, as some assert, the old spot, they wisely
the new place.

FEEDING BEES.

The best substitute for honey that I have ever found in feeding bees is sugar
y. The sugar should be mixed with water and boiled until it strings, and
cooled in thin cakes. The bees take no more of this than is necessary to
in life, yet will never starve while they have it. I have tried feeding bees
uce them to rear drones early, and to stimulate them to swarm early, but
no satisfactory results. When I had few colonies, I have fed weak ones
ve them; but find it poor economy to keep any stand of bees, under any
ances, which require feeding—far better to unite all the weak with the
ones.

some sections of the country it is a great help to bees to feed them with
al before the first pollen-yielding flowers come. Where I live there is
ly found a great deficiency of bee-bread in the majority of hives in the
g, and here the advantage of rye meal feeding can hardly be overestimated.
soon as the bees fly freely in spring, put the meal in shallow boxes or
a rod or two from the apiary, and attract the bees to them by pieces of
y comb laid near it. They soon learn the way to it and take it eagerly
lowers come, when it will be left untouched. I have had one hundred
teen pounds of meal carried away in one day. I have the rye ground
not bolted. Wheat flour will be taken by them, but not as readily. Meal-
bees will send out larger and earlier swarms than others, because the
ce of bee-bread encourages the rearing of brood.

ARTIFICIAL SWARMING.

It no longer a matter of doubt that the natural swarming of bees can be
d entirely, and yet such an increase secured as may be desired by arti-
. Some bee keepers still depend on natural swarming, but my
hes me that the only sure way to keep bees with a certainty of
nt is to take the matter into one's own hands and secure a moderate
y incr , and, at the same time, more or less surplus honey, according to
a
; that early swarms are the most profitable ones. How it may be

in other sections of the country I cannot say, but in Iowa bees pre swarm every year by the latter part of May. At that season I find in strong hive partly finished green cells and young drones; yet not one y ten do we have more than an occasional natural swarm at that season. reason, I think, is this: Near the last of May we have almost every yea cold days, and these cause the bees to destroy their green cells and to preparations for swarming. When it is again warm some colonies prepar and then throw off late swarms, while others make no further attempt th son. For the last four years I have made all swarms the last week in M first of June, and my new colonies fill the hives in many cases before my bors' bees swarm naturally. The two or three weeks thus saved at th time are of the utmost importance. Natural swarming has other disadva besides being late. The watching for their motions involves a great e of time and anxiety where many hives are kept. Every year, too, many n swarms go to the woods in spite of all care, while an artificial swarm, pr made, never does. Some colonies will refuse to swarm at all, and other swarm until the parent hive is worthless.

It is not difficult to make swarms in the common hive, but with m combs it is less trouble to make an artificial swarm than to hive a natural The danger is that one just commencing to use these hives is apt to o the matter. It is so hard to convince any one without *experience* that he growing rich in proportion as his colonies increase in number. If m frames are not to do the person using them more harm than good, a tho acquaintance with the internal economy of the beehive is necessary. T precisely what beginners cannot acquire at once, and yet they are often u scious of their ignorance. In this, as in everything else, the more one the more he feels his deficiencies. I have usually found that bee keeper ture less the second year of their experience than the first. I advise a commence with the movable comb hives to be contented with a very mo rate of increase until they have experience to aid them. In this matter, "He that hasteth to be rich shall fall into a snare."

In the early days of my bee keeping I reasoned thus: Since the queen only one that lays eggs, the more queens I have by the 1st of June the my bees are increasing; for certainly two queens can multiply bees faste one. I therefore aimed to have as many as possible early. I now s matter in a very different light; for while it is true that two queens c more eggs than one, it is not certain that they *will*. On the contrary, invariably, that the increase of brood is in proportion to the strength colony. If a queen in a weak colony should lay many eggs, they could reared when hatched, for want of honey and nurses. If many eggs are such hives, they are destroyed, some say eaten, by the workers. The seem to have the power of increasing or decreasing their laying at will. queen be taken from a small colony and placed with a larger and more po one, she soon increases in size and lays freely.

Examine a weak hive, poor in store, in the spring and you will find b cells of brood, while a strong one in the same apiary, and under the san cumstances of season and weather, will have sheets of comb filled with i stages. Exchange the queens in these two colonies, and one will increa the other decrease her laying. If this fact is borne in mind, it will be stood why one strong colony will raise more brood than several weak on that it is more profitable, especially in the spring, to have many bees in o than to divide their strength as is frequently done. Under no circum is there either pleasure or profit in weak colonies. The more of them has the less he will like bee keeping.

One plain rule should be borne in mind in artificial swarming: "Never the strength of the colony where the queen is to remain." As soon as

his her laying diminishes. If she is driven from the hive with the new swarm, e the largest part of the bees with her in the new hive. If she is left in the hive, leave abundant stores and young hatching bees with her, and she will stimulated to increase her laying to replace the bees taken. It is wonderful r ny bees, eggs and brood can be taken from one queen in a single season, left in a strong hive well provisioned.

d of dividing hives, as some do, in artificial swarming, I now prefer to brood and bees at different intervals from hives, as they can spare them, and these build up new colonies. For instance, you have six swarms in movable o hives. No. 1 you will not touch, but from the remaining five you take in ession two frames, each from near the centre of the hive, placing empty in their stead. Shake the bees off the frames, being careful that you take que on them.

e ten frames thus obtained in a new hive; then remove No. 1 to a new e, a roa or even more away, and set the hive containing the frames in the where that stood. This operation should be performed at a time of day many bees are in the fields, and these, as they return, will crowd into the de colony and labor in it as well as in their own. The colony having queen they will proceed to raise one, as they will find plenty of brood for the pose. If, when just made, a young queen can be given them, raised in a small e, you have a safe, sure way of increase. The hives from which the frames brood are taken will not be crippled by it, but, in many cases, will be actually better for it.

This operation can be performed again in two weeks if desired. The hive h you remove will not lose as many bees as if it had swarmed, but will soon s populous as ever, and, usually, will have no inclination to swarm that season.

Two things are to be avoided in making new colonies. One is, never to leave y bees in a hive which is queenless, and raising a queen. If there are too ny bees in a hive which has no queen they store honey in the combs where od should be, and after the new queen is ready to deposit eggs she is driven the outer combs for empty cells, and her brood cannot be as well cared for. ve seen many hives suffering from this cause. Again, never leave a queen-colony large enough to build new comb, as all the comb they build until have a queen will be, invariably, drone comb.

Many ways of making new colonies without disturbing the queen or dimin- her laying will suggest themselves as one becomes familiar with the s. If care be taken never to weaken colonies containing queens, and if young queens are reared for the new swarms in small hives, the number of es can be increased four-fold more safely than they can be doubled in al swarming.

hichever way you practice, *do all of it early*. Better far to leave the bees they are than to make a swarm late in the season.

SWARMING *versus* NON-SWARMING.

e has always been a class of bee keepers who have not cared to increase bees, but have simply wished to keep a few colonies in the best way to a ney for their own use, and who have neither the time nor disposition y to an extended business. To meet their wants, numerous bee palaces n-swarming hives have been invented, which have all proved failures. yields of honey have often been obtained in these hives for one or two s, and then the bees usually died out. The reason is obvious; for, if is prevented, some way must be provided to renew the queens every re years, for swarming is the method by which nature arranges this. price of lumber for hives, and the great demand for honey in 1864, it a good time to try what could be done in the way of restricting swarming,

or preventing it altogether. I had tried the non-swarming blocks in the Lang stroth hive, but found it impossible to make them of practical use. If kept close enough to prevent swarming they interfered much with the flight of the workers; besides, they did not, in any case, prevent the preparations for swarming which consume much time and honey.

Early in the spring I made some colonies very strong in numbers, and rich in stores, having them as strong as they usually are in June, hoping in this way to secure early box honey. I failed in this; for though the bees commenced wor in boxes they stored slowly, and not a box was filled before June; but the reared quantities of brood, and were ready for very early swarming.

Ten of these doubly strong colonies I treated in this way: I took fr centre of each hive, every week in June, a frame of brood and honey, supplying its place with an empty frame. Two of these swarmed in spite of this, and as the frames taken out were used in forming new colonies, it would not have been called a "prevention of swarming" if none had swarmed. Those that did sw were, at the time, storing in sixteen boxes each, proving that bees do not always for want of room.

From twenty of these strong colonies I took, in June, their queens, replacing them with young ones just commencing to lay, or with queen cells ready to hatch. Not one whose queen I changed in this way swarmed, but all wor on seemingly with new energy through the season, care being taken to give ample room in the main hive for brood, and to change full boxes for empty as often as necessary. The quantity of honey obtained from each of these varied much. The least obtained from any one was fifty pounds; the gr yield from one was ninety-six pounds, the average to each being sixty-two pounds. The colonies which swarmed that year all made some honey in bo the average being fifteen pounds. The swarms from these also stored honey, the average being thirty pounds. Thus we have an average of forty-five p (fifteen from the parent hive, and thirty-four from the swarm) from the sw ing, against sixty-two pounds from the non-swarming hives. From the fo a good colony was obtained to offset the seventeen pounds more honey ave from the latter. These experiments were all made with the common bees.

I had previously made an ingenious calculation of this sort: "The bees sume twenty pounds of honey in forming one pound of wax. The empty comb in a hive the size I use, (2,000 square inches,) weighs three pounds. Thus, sixty pounds of honey are consumed in making the empty comb alone to the new hive. At least sixty pounds more will be used in storing the co raising the brood to populate it, and thirty more to furnish it with win This gives one hundred and fifty pounds of honey spent on the new co Supposing the bees to have remained in the old hive, this one hundred and fifty pounds might have been stored in boxes." Now, this calculation is all true, the fact remains that the bees will not put as much honey into boxes as gather to stock and store a new hive. The empty home stimulates th necessities drive them; and they "work with a will" under such circum as all know who have noticed the untiring energy of a new swarm.

In the summer of 1865 I tried this plan again on a larger scale, giv to of thirty-seven hives, in May and June, a young queen in place of a Only one of these swarmed, and, in that instance, I was quite sure that stroyed the queen given them and raised others, and this caused them to sw

Writers in Germany assert it as an established fact "that changing an queen in any hive for a young one of the current year, *before preparat swarming have been made*, will prevent it for that year." I am not pr yet to say that this will always be effectual, nor can I assign any r factory to my own mind why it should prevent swarming. I have g results of my experiments, and they certainly go far to prove the fact. I recommend all who are Italianizing their bees to try this plan, and see

ts follow from their change of queens. If swarming can be prevented in way no better method need be sought, as it secures young and healthy ı in all hives. The rearing of queens and exchanging them is a very simer, and if there is a demand for queens, those taken away can be sold aa of being destroyed.

ı price of honey and the demand for bees in different places must decide n st profitable to raise, bees or honey. In most places I think bee pers wuı find it pay best to secure a moderate increase every year by making swarm, very early, from four or five old ones. In this way, quite as much, t more, surplus honey will be obtained as when there is no increase, and the з of the new swarms (whatever that is in your locality) is just so much extra nt.

To the class of bee keepers who prefer the non-swarming method, a statement the German Bienenzeitung (or Bee Journal) of February 15, 1864, made B. G. Klein, will be interesting. He lives near Gotha, limits his apiary ighty hives, restricts swarming as much as possible, and unites such swarms do come with the colonies found to be weakest in the fall; carefully preserves mbs made by them for use the next spring, and winters them in the shallow, able-comb hives; but does not say whether in doors or out.

eighty hives he obtained *a profit* in 1861 (a very favorable year)

or.	$601 82
, (an exceedingly poor year)	76 87
363, (a good year)	246 96

The average price of honey there is only about eight cents per pound of our rency. Though this may seem a satisfactory profit, it is small compared with t has been obtained from bees when allowed to multiply in this country. I t give statistics of the amount of profit from bees in other States, but some ts in Iowa far exceed this.

G. McNiel, of Tipton, Iowa, says: I shifted 6 colonies of bees out of into the Langstroth hive for a gentleman, in May, 1859; that year he into 24 and took off 500 pounds of honey. The next spring he began 18 weak colonies and increased to 46. This year (1860) he took off 1,000 s of honey. In 1861 he increased to 60 colonies, and took off 2,200 s of honey. In 1862 he increased to 104 stands, but, it being a poor n, he obtained only 1,500 pounds. In 1863 he increased to 160, and took ,000 pounds of honey. Thus he obtained 8,200 pounds of honey and 154 s in five working seasons.

a not prepared to give an accurate statement of each year's gains, either y or stock, since I commenced bee keeping; but in the spring of 1859 c ed four hives for $20, two of which died before flowers came. In umn of 1865 I was offered $1,500 for my stock of bees, but declined ng, as they are worth much more than that to me. Thus we have, in six ns, an increase from $10 to $1,500 in the capital alone, with no account of y sold each season, or of bees sold repeatedly.

ring the summer of 1864 I sold from twenty-two hives $409 20 worth of . Two of these seasons are called the poorest ever known in Iowa. branch of agriculture or horticulture pays better than this?

UNITING BEES.

fall, in every apiary, some weak stands will be found. Some will have r bees, others too little honey. In the old-fashioned bee keeping such oyed by fumes of burning brimstone, and the honey and wax p s a very expensive way, and, with the movable comb-hives, e and all comb may be saved for the use of the bees in the

future. All can see that it is poor economy to let bees live until they co all the honey, and then die of starvation; better the old way than this. But if one containing enough honey but too few bees be united with one that has numbers and but little honey, they make one valuable stand. So two weak united make one good one; for a large colony does not consume nearly as honey, proportionally, as a small one. In the spring, too, in spite of all care, some will be weak; and these are much more profitable if united with ones than if nursed until flowers abound.

Bees can be easily united, and will work as one colony. Some sprinkle with sugar-water scented with peppermint, or other strong odor, to give both same scent, and then put both in one hive. I find it easy to do it with and never have any difficulty in the operation.

I alarm the bees of both hives which I wish to unite, then leave th few moments to fill themselves with honey. I then put one of them over an hive, (my hives have movable bottoms,) take each frame out, and shake or the bees into the hive below. When all are out, set the other in its pl proceed in the same way. The bees all brushed together thus into an hive are too much frightened to quarrel. I then arrange all my fra containing honey in one hive, and set it over the one in which the bees are. They all go up rapidly and take possession of the frames like one colony. One of queens will, of course, be *killed;* so if you have any choice between th out the one you care least for and destroy her.

Every empty comb should be saved; indeed, no piece of good worker c should ever be melted for wax—it is worth $5 a pound in honey boxes or tened into the frames for the use of the bees. I once tried an experiment which convinced me of the great saving in providing bees with empty comb when it is possible. I had two large natural swarms come on the same day. One of them I put into an empty hive, and the other into one well filled with comb. The one in the empty hive filled it up for winter, but stored no surplus honey. The other not only filled the combs, but stored fifty-two pounds of honey in boxes. There was no apparent difference in the size or circumstances of the two swa The value of the comb, melted for wax, would not have exceeded a do at that time; while the honey sold, at 15 cents per pound, for $7 80. Str worker combs, in movable frames, are better than cash capital to a bee keeper, and should be most carefully saved. Combs must be kept until wanted for use in a cool dry place, to guard against mould. Mice are very destructive to I hang mine on a rack where mice cannot get at them, and where they have abundant air. Two or three frames filled with worker comb, given to a swa when it is first made or hived, are a great help, and cause them to build all combs straight.

HONEY RESOURCES.

Every bee keeper should know the honey resources of his range. They differ much in different localities. My apiary is near a river bottom, where the bees have a large forest range, and here there are few days from April to October in which they do not find honey. In many localities much may be done to increase the yield of surplus honey by keeping buckwheat in blossom m of summer. Germans estimate the yield of honey from one acre to be fr 20 to 350 pounds. This crop, however, yields much more honey some seaso others. Bees do not like buckwheat when they have anything else; and seasons when I have had acres of it sowed for them, I have obtained buckwheat honey, while another year the buckwheat sown for them the July has added many pounds to my surplus boxes.

White clover yields much honey for several weeks, and where it abou are sure to do well. The Alsike or Swedish clover, where it has be luced, is of great benefit. Black or common bees cannot reach the n

clover; the Italians can and do, under some circumstances. In the latter of July, 1864, my common bees were idle and losing weight daily; but Italians steadily stored honey in boxes. I took off twenty six-pound boxes ir the Italian colonies, while the others did nothing. It was evident that they re obtaining it from some source not accessible to the common bee. On visit- fields of clover at various times I found it always swarming with "yellow kets." On account of the drought the blossoms were smaller that year than il. Late in September and early in October in the same year I had several boxes filled by the Italians after the common bees had done storing; and this honey, I doubt not, was obtained from the second crop of red clover. In some ons, rape and mustard, if sown for the purpose, would come in and fill up in time of scarcity.

It is recommended by some to cultivate borage for bees. It undoubtedly has ey in it, and is a favorite with them. But there are few regions of our coun- where it will pay to sow it. It is an annual, and is easily grown. It is than weeds that have no honey, if that can be called praise. If any one watc s his bees closely one year he will discover at what date they are idle, ily arrange for another season to have some honey producing plants in m just when they are needed. By this way one may add many pounds to surplus honey.

In Europe it is customary to move bees from place to place, as different crops in bloom, and much attention is paid to raising crops which, in addition to value, yield honey. In few parts of our country will this ever prove neces- r. Wherever I am acquainted with the resources, it seems to me more neces- r to have strong colonies at the right time if we would secure large honey crops.

The vicinity of bees to water is a matter of more consequence than would be supposed by one who is not acquainted with their habits. It is asserted that a colony of wild bees is never found elsewhere than near a stream, lake, or river. Bees use much water, both in preparing winter food for their young, and when they themselves are secreting wax. If no water is near the apiary, shallow troughs, with floats in them, should be kept constantly filled with water for their use, and in this way much time and labor be saved them.

THE BEE MOTH.

The injury done by the miller and its progeny of worms has been over-estimated. Undoubtedly, before its advent, it was comparatively easy to care for bees. Then weak swarms could be saved and nursed into good stocks, while now they are quite sure to be destroyed by moths. In all my experience with bees I have never yet seen a good or valuable stand injured by worms. I often find them in such hives, but the bees gnaw them out and they do no real harm. But if a hive becomes queenless, or reduced in numbers, it is soon over-run. In every stock that I ever examined something was wrong before it became a prey of worms.

Much time and trouble may be saved to the bees by looking out and destroying every worm, especially in the spring. As they have four generations in one season, every one destroyed then sensibly diminishes the number. Many of them hide in "patent moth traps," and it is a good plan to catch them; but I have seen so many allowed to *hatch* there before they were caught that I cannot recommend them. To careless bee keepers, they are worse than useless; and painstaking ones do not need them. I often hear it charged that the miller is much worse in movable-comb hives, and has "much increased where those hives have been introduced." This may be, and probably is true, though not from any fault in the hives. The principle they involve is a perfect protection against the moth, but they have made the multiplication of colonies so easy that, with

young beginners, many more weak colonies abound. Where a hive co more combs than the bees can cover, the millers have a fine chance; and when a large hive has but a small colony in it, the other half is a fine shelter fort For those, and those only, who have learned by experience that the only sure way is to keep bees strong in numbers, under all circumstances, the miller no terrors. Patent hive vendors, who know nothing of the natural history of the bee, and care less about it, so that by some plausible story they dispose of a right, are the worst enemies of the bee that I have ever known.

Hundreds of valuable stocks have been ruined, within my own knowledge, by being transferred from one hive to another in a wrong way, or at a wrong season, or by being divided without regard to the principles which should govern the matter to make it successful. When we can enlighten people on the science of bee keeping, and awaken an intelligent interest in the subject, commensurate w its importance, we shall develop one of our great natural sources of wealth to an extent we have never yet approached.

THE ITALIAN BEE

Has now been so generally introduced into all parts of our country, and is received with so much favor, that it may seem superfluous to touch upon it here; but as I still see various queries as to its value compared with the common bee, I may be allowed to give some statistics. It is quite common to see account the great yield of honey from a single stand of bees; but isolated cases of kind prove nothing. The only fair way to decide the matter is to take these bees side by side with the others, under the same circumstances of season, pasturage, age of queen, and management. This has often been done, and always with results overwhelmingly in favor of the Italians.

In the summer of 1863 I had but two stands of Italian bees, and those not pure. One of these stored 110 pounds of honey, besides giving three swarms. The other gave two swarms and stored 96 pounds of honey. All the swarms filled their hives, and some of them stored honey in boxes. I had, the same season, 56 hives of common bees; but not one of these stored a pound of surplus honey, though a part of them were divided. That was the poorest honey season ever known in this section.

In the summer of 1865 I averaged, from nine Italian colonies, 119 pounds each. The best of these shows the following record in my journal: One full swarm taken from it the 20th of May; 156 pounds of honey taken in boxes; stored by the swarm, 80 pounds; from the swarm there came a swarm, August 15, which filled its hive and partly filled two boxes. Thus we have 236 pounds honey, besides two large swarms, from a single hive! The same summer I had 30 stands of common bees, which I prevented from swarming, yet with no increase from them. I obtained only 1,655 pounds of honey, or an average of about 56 pounds to each. The largest yield from either was 96 pounds.

In 1865 I had an average of 93 pounds from six Italian colonies, all of which were divided once, and much disturbed by taking brood from them to rear queens. During the same time I did not take a pound of honey from any colony of common bees, though I divided them all, and gave each an Italian queen.

I claim that facts like these are conclusive. All my bees were wintered alike and all in the same kind of hives, were made as equal in strength in the spring as possible, and enjoyed the same range. I might quote pages of testimony to the same effect from others; proofs abound wherever the bees have been tried in the same way. If I am asked the reasons for so decided a difference, I can hardly give such as are satisfactory. The bees do not differ much in size, but the Italians are more industrious; they work earlier in the morning and in colder weather. I am not prepared to say that they are more hardy. If they winter

better, as some assert, I think it is because the queens lay later in the fall, and thus keep the colony strong in numbers until cold weather. They have access to flowers which are useless to the common bee. That their bill is longer, any one can prove to his satisfaction in this way: Fill a tumbler with diluted honey or sugar sirup, cover it with wire cloth or perforated tin; have it so full that the contents touch the cover, and set it near bees of both kinds. After the black bees have taken it as long as they can reach it through the wire, the Italians will be found still upon it, filling their sacs and evidently lowering it.

Not only do they store more honey, but their queens are much more prolific than the black queens. It is wonderful how much brood may be taken from one of these queens. From one hive the last season I took thirty-two frames of brood and eggs at different times from which to rear queens, and from another thirty-six frames, yet both hives are as strong this fall as any of the common ones from which only one swarm had been taken. As ten frames fill one of my hives, it will be seen that this was equal to three full swarms from one, and more than three and a half from the other.

CHANGING FROM COMMON TO ITALIAN BEES.

The ease with which this is accomplished brings Italian bees within the reach of all, in every part of our land. Pure queens are raised by reliable persons and sent, as ordered, anywhere with perfect safety. If it was necessary to purchase and transport full colonies, the work of introducing the new variety would be much more difficult and expensive. Now, any one who is convinced that the Italians are better and more profitable can order one or more Italian queens, and from them raise others to supply all his hives. Many and full directions have been given how to Italianize, but still the plain, simple way seems to be little understood. Having been engaged in the work for three seasons, I shall try to give some hints which may be valuable to those commencing in it.

The queen being the mother of the whole colony, it follows that if a pure Italian queen be given them instead of their own all the bees reared after the change are Italians; and as the bees already there die off they are replaced by the others, and the stock, in a short time, is fully Italianized. By a *pure* queen, I mean one of pure stock, and which has been fertilized by an Italian drone. There has been much stock reared in this country which is *hybrid*. By this I mean the progeny of a pure Italian queen fertilized by a common drone. This, in the *first generation*, is hard to be distinguished from the pure; but it soon degenerates. As the drones are *invariably* like their mother, those reared from such hybrid queens are *always pure*. This fact should be borne in mind, as it makes it comparatively easy to keep the stock right.

The queen with which you commence should be pure beyond doubt. Purchase of some one who will warrant her, and whose guarantee you can trust—remembering that in the beginning you will be no judge of their purity. The fall is the best time to purchase your queen, because she will then be ready for early operations the next season. Introduce her into the best and strongest colony you have, for safe-keeping through the winter. If you have but few colonies, the work for the next spring is very simple. About the middle of May, if you examine the hive containing your Italian queen, you will find drones in all stages. Then take the queen out and confine her in a cage made by rolling piece of wire cloth, four inches square, into a tube, tying it firmly, and putting oden stopper in each end. Next remove from another hive its queen, and ving killed her, insert the queen cage between the two frames, and keep her re forty-eight hours. Then release her, and that hive has an Italian queen. ne one from which you took her will preserve its pure drones with care, and nmediately proceed to rear queens. In ten days you will find from six to

twelve queen cells nearly ready to hatch. Then take from as many hives as you have queen cells their queens, and leave them queenless about ten or twelve hours. Then from one of the hives take a centre frame containing brood, a hole two inches in diameter; cut out one of the queen cells from the hive containing them, with a little comb each side of it, being very careful not to p[illegible] or injure it in any way; dip the edges of it in a little melted wax and insert it in the frame, and put it back in the hive. In nine cases out of ten this cell will be gladly received by the bees, and hatch in a few days. This process may be repeated with as many hives as you have cells, and if done by the last of May or first of June you may be quite sure that these young queens will be fertilized by Italian drones, *because you will have no others in your apiary so early in the season.* One or more cells must be left in the hive where they are reared, that it may be sure of a queen; and all your hives should be examined from time to time, to see that the cell in each hatches, and then to be sure that the young queens all lay at the proper time. I usually find them depositing eggs between the third and twelfth days after they hatch. If any colony fails to secure a fertile queen in this way, insert into it, from the hive which now contains your Italian queen, a frame containing eggs, and from that they will rear others. Before doing this, look over all the frames carefully to see that they have not commenced cells from their own eggs.

After you have a fertile queen in each hive, watch the young worker bees as they hatch, and if all, or nearly so, are slender in form and have three distinct golden rings, you may *hope* they are pure. If there is a doubt about any one, you can exchange it for another at your leisure. Bear in mind that the main thing the first season is to get a young queen in every hive, reared *from the one you purchased.* That accomplished, all your drones will afterwards be pure, and young queens reared from that time forth will be quite sure to meet pure drones. The following spring your hives will have drones in them two weeks in advance of all black bees in the neighborhood; and if yours are strong, and you make early swarms, the chances are much in favor of your queens being purely fertilized.

The second season of your operations all doubtful queens should be replaced; and if pains be taken you can easily have none but pure queens in your hives while the original queen which you purchased lives. I find the temper and disposition of the bees a better test of purity than their markings. The Italians are more easily managed, and less easily provoked to anger. If you open a hive of them and lift out a frame, instead of flying about in all directions and getting in a rage, (as do the black bees,) hardly a bee leaves the comb—all cling to it quietly until it is replaced. Where you find them thus clinging to the comb you have one good mark of purity.

The only *certain* test that I rely upon is the color and markings of a queen's *royal* children, or the *queens* reared from her. The female bee is invariably like the father, and the queens are the only *perfect* female bee. If you rear queens from a queen, and they are well marked and colored, you may be sure she is purely impregnated.

I had a number of fine queens last season whose worker progeny was so well marked that I had little doubt of their purity. Yet on rearing queens from their eggs they are not like their mother, and *their* eggs, when tested, produced queens hard to be distinguished from common ones. This fact will explain why the Italians, in careless hands, so soon degenerate. There is no need of this if the queen you purchase is pure, and you take pains the *first* season to put a queen reared from her into every hive you have; and, in the *second* season, to replace all which show impure marks.

The most difficult part of this process, as I have described it, (and it is more easily done than described,) consists in *finding the old* queen. At swarming

time (the best season to do it) the hives are or ought to be populous; and to the beginner it seems a formidable operation to look the frames over, and find *one bee* among so many. Place an empty hive by the side of the one you wish to examine; after opening the latter very gently, sprinkle it well with sweetened water. It is better not to alarm them by the use of smoke when you wish to find the queen. Begin near the centre, and take out a frame, and look carefully on each side of it. If she is not on it, put it in the empty hive, and take out another, proceeding in the same way. If the queen is found on neither of them, spread a sheet before the hive which now contains the frames, and empty upon it the bees that remain clinging to the hive. If she is among them you will see her as she passes into the hive. If you do not find her, return the frames to the other hive, examining them with care. I have often found the queen on the first frame I took out; and then, again, have taken them all out three times before seeing her. There is little difficulty in finding Italian queens; they are not disposed to hide, and their bright colors make them very conspicuous.

Those who are Italianizing large apiaries, or rearing queens for sale, need no advice in the matter, yet may be interested in some items of my experience. I have succeeded better in rearing queens in moderately large hives than in the small ones generally used for the purpose. I now have my nucleus hives, containing three frames, the size of my large hives. A hive containing twelve frames, which can be divided into four parts at will, is very convenient, the entrance into two of the parts being at the ends, and in the others at the sides. Such a hive is warmer than a single nucleus, which is important in the early part of the year.

If such a hive contains a pure Italian queen, and she be taken from it in May, there will be eggs in each of the four parts when the dividers are put in, and from thirty to forty queen cells will be started at once. In ten days as many of these as you please can be cut out and given to other hives, but four or more should be left in it. The young queens hatched in these hives are very sure to mark their place when they go out for their excursions, as the size and entrance make it peculiar in appearance.

Much complaint is made that the whole colony is apt to go out from a nucleus hive when the queen leaves for impregnation and does not return; thus queen and all are lost. There is a sure remedy for this: Bees never desert a hive, large or small, while there is brood in it. If, then, a frame containing eggs and larvæ be given to the small colony from another hive, about the time the queen will hatch, the bees will not desert it. Some have trouble in making the bees build more than one or two cells in these little hives. That is because they do not have a large proportion of *young* bees in them. The young bees of the current year are the ones that work the wax and build queen cells. They may be seen before they are twenty-four hours old at work on them. Keep plenty of bee bread and honey in the small hive, and supply it with water and young and hatching bees, and you will have numerous cells.

Be always sure that, in the hives where you are rearing queens, there are no eggs except from a queen of undoubted purity. It has been declared impossible for bees to remove their eggs from one cell to another, but I now know that they do so. Last year I put into nucleus hives, each, a frame containing eggs, while the other combs, full of honey and bee-bread, were those preserved from hives from which the bees had been taken, and which had been all winter in a cold room. By no probability could an egg have been in these, yet repeatedly were green cells built in them, and perfect queens hatched from them. I do not pretend to say how the bees remove so delicate a thing as one of those little eggs without injury; but is it really any more wonderful than some of their other operations?

I have reared queens every week from the 1st of April to the last of October,

and could perceive no difference in size or coloring at the different seasons; but out of eighteen reared in April last only two became fertile; and of twenty-two reared in October, all but four were lost, while nearly all those reared in May, June, and July were impregnated.

I do not find the pure Italian queens larger in size than the common ones; but queens reared from a pure Italian mother, fertilized by a common drone, are often very large and handsome. The colonies of such queens are, in every respect, equal to the pure. All such queens may be safely preserved, as *their drones are pure.* But no queens should be raised from them, and if swarms issue from their hives the queens should be taken from them and pure ones given them, for *nothing pure* comes from a queen reared from such queens. No one should be contented to stop short of giving a queen *which will produce pure drones* the first season to every hive he has, whether it be one or one hundred. This accomplished, your work is more than half done. The importance of this is manifest, for you will then have no common drones in your apiary the second season. When this is the case you can keep your own colonies strong, "swarm" them early, and have little to fear from outsiders.

So long as you have common drones a large proportion of your queens will meet them. I raised one hundred and forty-three queens the first season, which became fertile, and though I had many Italian drones in a dozen hives, and suppressed the common drones as much as possible, only twenty-six of my young queens were fertilized by Italians.

It is said, and I doubt not with truth, that in all Italian stock brought to this country there is a taint of impurity. This is of little consequence if we keep our stock pure. By exercising proper care, we can not only keep them as good as the original, but also do much to improve them. I have several young queens even more beautiful than those I bought, and queens reared from them are as fine as any I have ever seen. Every one which does not produce pure drones should be replaced as soon as this is discovered, and those which are only hybrid may be changed before swarms are taken from them. All this requires care and patience, but it pays well to take this care.

In no way can the yield of honey be so sensibly increased as by introducing the Italian bee into different localities. As it replaces the old variety a great change will be observed.

I cannot think it wise for those rearing queens to sell to send out any but those tested and proved pure. The practice of selling hybrid queens, or of sending those not tested, to those who are commencing in the business, promising to replace them if not pure, is a bad one. The beginner (who, perhaps, has never seen an Italian bee) cannot himself be a judge of purity, and in nine cases out of ten will be satisfied with what he gets, and rear from it. Though he will find any mixture of the Italian blood an improvement on his old stock, yet, in the second generation, he will have *nothing pure,* and be disappointed and discouraged. One had better pay a large price for a queen warranted pure by one whose reputation is at stake in the matter than to get a hybrid cheap, and find, in a year or two, that he has had all his trouble for little or nothing. I would advise every one purchasing a queen to clip her wings before putting her in a new home. It not only prevents her leaving the hive with a swarm at any time, but you are always sure that she is the one you bought, for bees often destroy a queen for no apparent reason.

SUBDUING BEES, BEE-DRESS, ETC.

I find a great difference between the Italian and common bees in their irascibility. The former are much more easily managed. Still the timid will do well always to use some precautions. Sprinkling with sugar water is the

means of subduing them when you wish to open the hive. If you wish to a queen readily do not use smoke, it induces her to hide; but for any other ıation of the hive it answers well. A wire hat with a deep curtain to it, a pair of rubber gloves with gauntlets, make a perfect protection against . The gloves are very expensive, as they soon wear out from contact wı.. the bee glue or propolis. I find a pair of woollen mittens, with thumb finger, as knit for soldiers' use, quite as good protection. They should be ıed in cold water before using. From these glue can be easily removed. quiet, fearless manner when among bees does much to prevent their anger. stand should ever be made angry; they do not soon forget it, and after are once enraged they are difficult to subdue.

ADAPTATION OF THE BUSINESS TO WOMEN.

Health is to be derived from it. The ancients called the honey bee "Debo- or she that speaketh." Would that its gentle hum might now *speak* to y women in our land, and awaken an interest in a pursuit so interesting, , at the same time, so profitable. The quick observation and gentle handling, requisite in the business, belong peculiarly to women, and there is no part of which is laborious, or that may not be appropriately performed by them.

It has proved to me of great benefit. I came west twelve years ago, under ence of speedy death from one of New England's best physicians, yet now ıce in perfect health restored. More than to all other causes I attribute the ;e to the interesting occupation which has kept me so much of the time in open air, and *paid me for being there.* I most heartily recommend it to , who are seeking either health or a pleasant and profitable employment.

WHITE CHESTER BREED OF SWINE.

BY PASCHALL MORRIS, PHILADELPHIA, PENN.

The most approved and desirable points of the white Chester breed of swine are length and depth of carcass, breadth of back, small bone, very small head in comparison with the size of carcass, full ham, shoulders full and well pushed towards the head, leaving little or no neck, heavy jowl, dished face, thin skin, straight hair, and straight back.

The engraving represents a large and fine animal, combining in consider- le perfection all the above points. He will be sixteeen months old on the of January, 1867, and is estimated to weigh at that time, when he will slaughtered, at least 550 pounds. His face is remarkably small. This is of the most difficult points to secure, and is often an indicator of the rest of figure, as well as of fattening properties. I have always found that a hog th a dish-face, short nose, small head, and breadth between the eyes, is right arly everywhere else, and is an easy and quiet feeder. On the other hand, a g nose, and a long and large head, indicate, in a general way, a hard and asy feeder and a great consumer.

The white Chester breed of swine is not an original, but a "made-up" breed, being a cross between the best native stock of Chester county and an imported Bedfordshire boar. He was imported by Captain James Jeffries more than forty

years ago, and his stock was well distributed over the country. The differences now observed, sometimes, in the white Chesters, so that they can hardly be identified as one breed, are owing to the extra care taken by some farmers in selecting their breeding stock, or to their various fancies. Some prefer an erect ear, others a lop-ear; some prefer a slight curliness or wave of the hair, or to have it perfectly straight; some do not wish a large carcass, but a small and compact one, attaining a weight, at a year old, of about 300 pounds. The western farmers, living where corn is plenty, require a very large animal. These differences do not detract from the merits of the Chester county hog, as regards good general figure, easy feeding, and capacity to return a greater weight and value for food consumed than any breed now known. Farmers who breed for weight usually estimate a gain of one pound per day till they are two years old, and these very often far exceed this. They have attained a weight of over 900 pounds, and 500 to 600 pounds is very common.

That the Chester county pig is not an original, but a mixed breed, is proved in the very great variety in their appearance and in feeding qualities. I does not produce like in all cases; and what is called "breeding back" is quite common. There is no absolute certainty of the offspring being like either sire or dam. Very fine and perfectly-shaped sows often have indifferent and very fine pigs are also occasionally produced from ill-shapen mot Sometimes blue spots on the skin and black spots in the hair occur. Th are probably to be traced to a cross of Berkshire, a breed at one time common in Chester county. Improved stock of every description, to be up to a certain standard, *requires continuous care in breeding and feeding.* Hence the common saying, as respects swine, that "the breed is in the trough." While it must be admitted that the good points and properties of the Ch county breed are not so confirmed and established, that like will always produce like, there is yet, taking the best samples, so full a development of nearly perfect figure, quiet habits, and fattening tendencies, as to make a capital ground-work, which some energetic farmer may use as a starting point, as Bakewell, and Ellman, and Webb did with sheep, and bring up the white Chesters to a still higher standard and a more determined type.

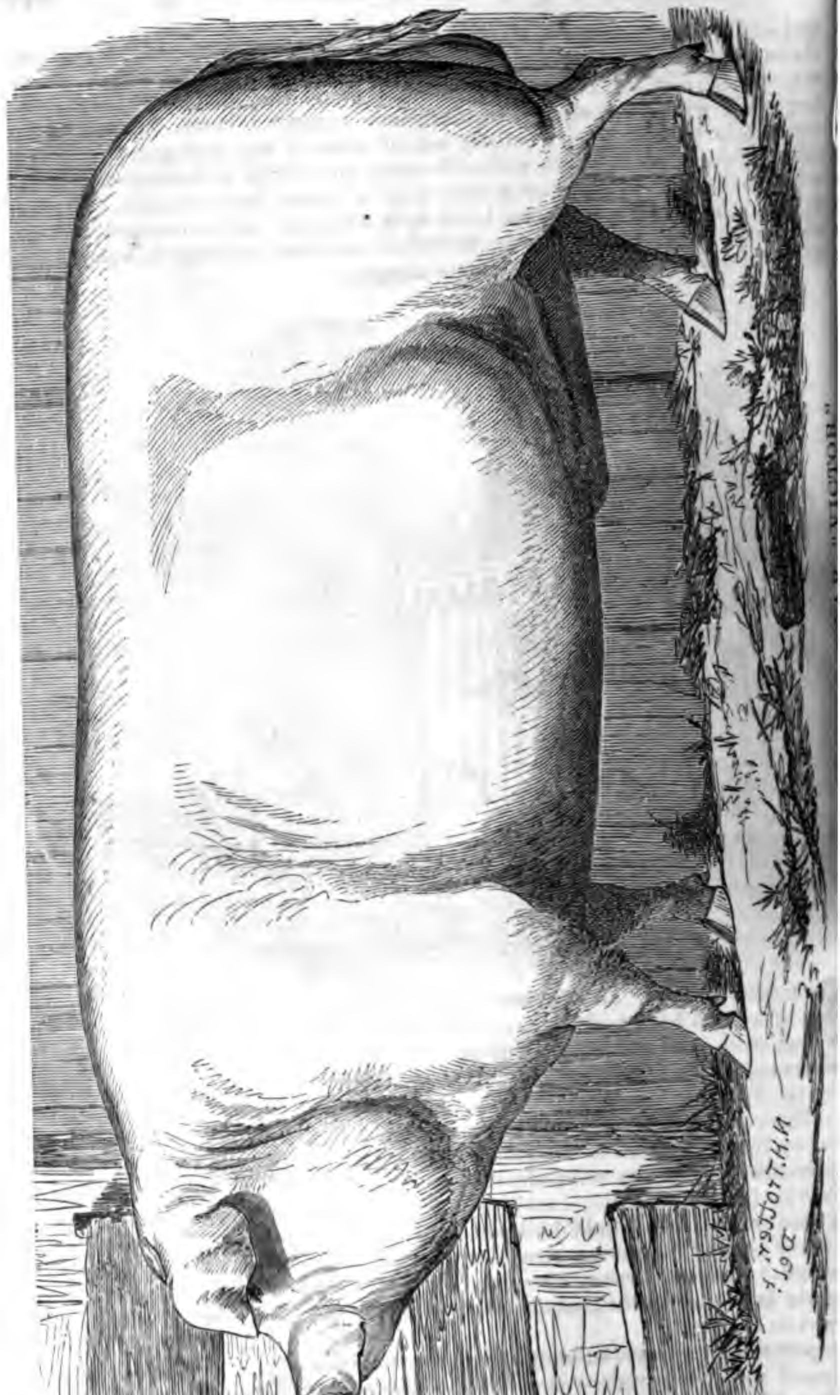
The hog is often the poor man's main reliance, every portion of it being ceptible of use; and if his weight at a given age can be doubled on the s amount of food, a vast benefit will be conferred on the economic interests of masses, and a large addition to the aggregate wealth of the country.

MODEL PIGGERY.

BY PASCHALL MORRIS, PHILADELPHIA, PENNSYLVANIA.

The plan of the piggery delineated in the accompanying engraving is susceptible of reduction or extension, for a larger or smaller number of pigs, and is intended to supersede the not only useless, but objectionable as well as expensive, mode of constructing large buildings under one roof, where confined and impure air, as well as the difficulty of keeping clean, interfere greatly with both health and thrift. Twenty-five or thirty breeding sows, farrowing at different periods of the year, can be accommodated under this system of separate pens, by bringing them successively within the enclosure; or an equal number of hogs can be fattened without any crowding or interference with each other. Some two years

PLATE XXVI.

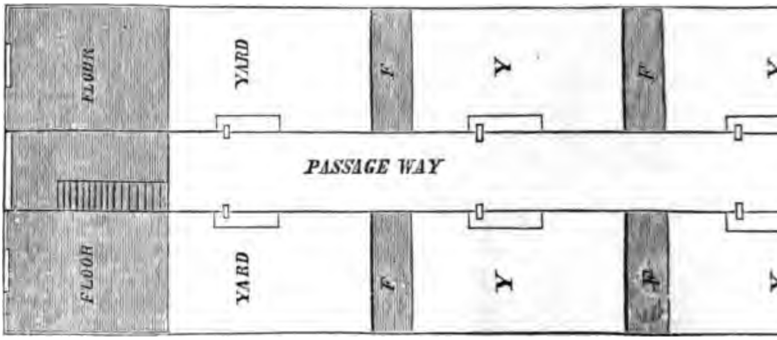


I sold a very fine pair of Chester county pigs to a customer, (not a farmer,) complained that at the end of twelve months they only weighed 175 pounds .. On inquiry as to his management, I found they had been kept in the e stable, which was cleaned regularly once a month. It was dark and badly ilated, and the pigs were entirely out of reach of sun and pure air. The city of life shown by the white Chesters, under such circumstances, spoke for the breed. Thrift and growth were of course impracticable. Neither white Chester, nor any other breed with which we are acquainted, will do in confined or close quarters; and where too many are kept in a single pen heat of contact is very apt to create mange.

he nature of a hog, no less than the composition of his food, indicates a large unt of animal heat, and we have always noticed that they suffer much more heat and confinement than from cold. This fact is kept in view in the re arrangement. The entrance, as seen in the engraving, is on the north of the building, which therefore fronts the south, as does also each separate The main building is thirty-two feet long by twelve wide, with an entrance at each lower corner to the yard of two first divisions. The entry or room e centre is eight feet wide, allowing space for slop barrel, feed chest, char- barrel, (almost as indispensable as feed chest,) hatchway for access to root r underneath the whole building, and also passage way to second story. latter is used for storing corn in winter and curing some varieties of seeds mmer. A wooden spout, with sliding valve, conveys feed to the chest below. grain is hoisted to the second floor by a pulley and tackle on the outside, as rved in engraving.

he perspective of main building allows a partial view of platforms, surmounted board roof, and divisions in the rear. The ground plan allows six of these ither side of the passage way. The first two pens, to the right and left of loor, are 12 by 12 each, and attached to them are 25 feet in length of yard

by 15 feet wide. All the yards are extended three feet wider than the bu which admits of the two entrance gates at the corners.



Another division then commences, consisting of a raised platform, 6 to wide, and extending the same width as the first pen, with a board roof o and also boarded up on the back, which answers the purpose of a division to separate from the pen behind. Twenty-five feet of yard are also attacl this, and the same arrangement is continued to all the six divisions.

We have found this board roof and wooden floor on the north side of pen and fronting the south to be ample protection in cold, wet, or stormy we The floor is kept perfectly clean, and even the feeding trough is not on account of more or less of wet and dirt always contiguous to the trough, freezes in winter and becomes slippery.

Each yard is used for the deposit of refuse vegetables and weeds, litter thrown in from time to time, to be consumed or converted into manure. is conveniently loaded into a cart passing along on the outside of each ra pens.

The passage way between each range of pens gives convenient access feeder for all the divisions. A door also communicates from one division other, to make changes when necessary; and also a door or gate from eac to the outside, so that one or more can be removed and others introduced wi any confusion or interference from any of the other pens. The two pens the main roof of the building, being more sheltered, are reserved for sow may happen to farrow very early in the season, or in extreme cold we which is always avoided if practicable.

For several reasons, the boiler for cooking food is in a rough shed adjac the piggery and entirely outside of it. There is no reason why this shou necessarily a part of the piggery.

The above plan is not offered as embracing much that is novel in arr ment, but as one that combines many advantages—

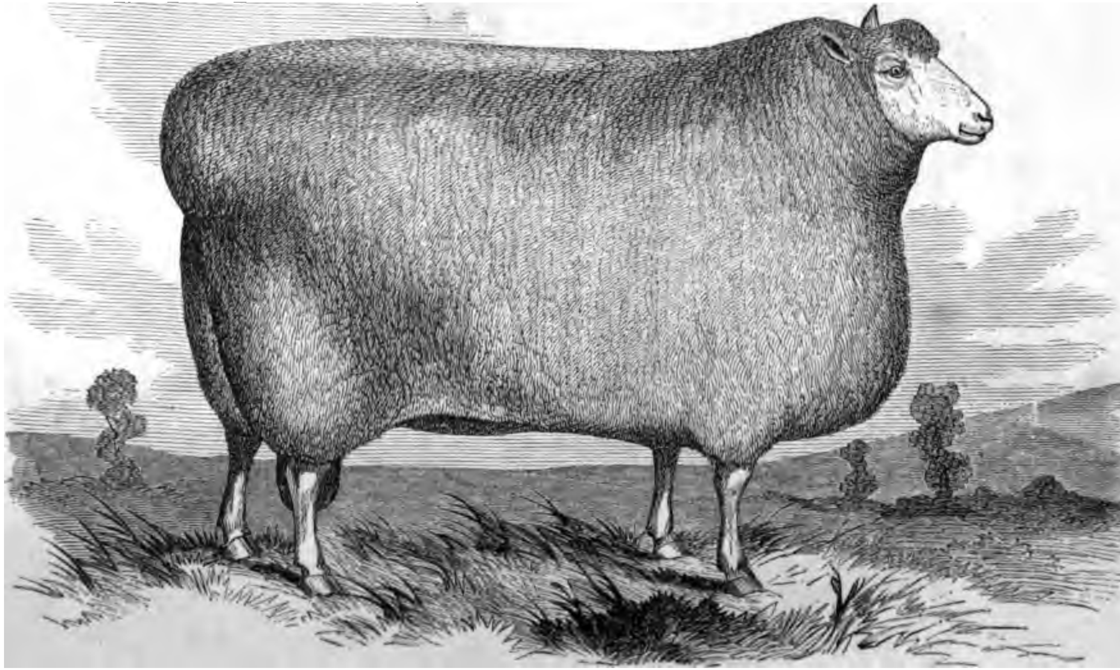
1st. Complete separation, as well as easy communication between each as well as to outside from each.

2d. Avoiding close and confined air, and admitting of extension or alte for a large or small number of pigs.

3d. Facilities for keeping clean and receiving refuse vegetables &c., for conversion into manure, and also for loading from each pen into passing along outside.

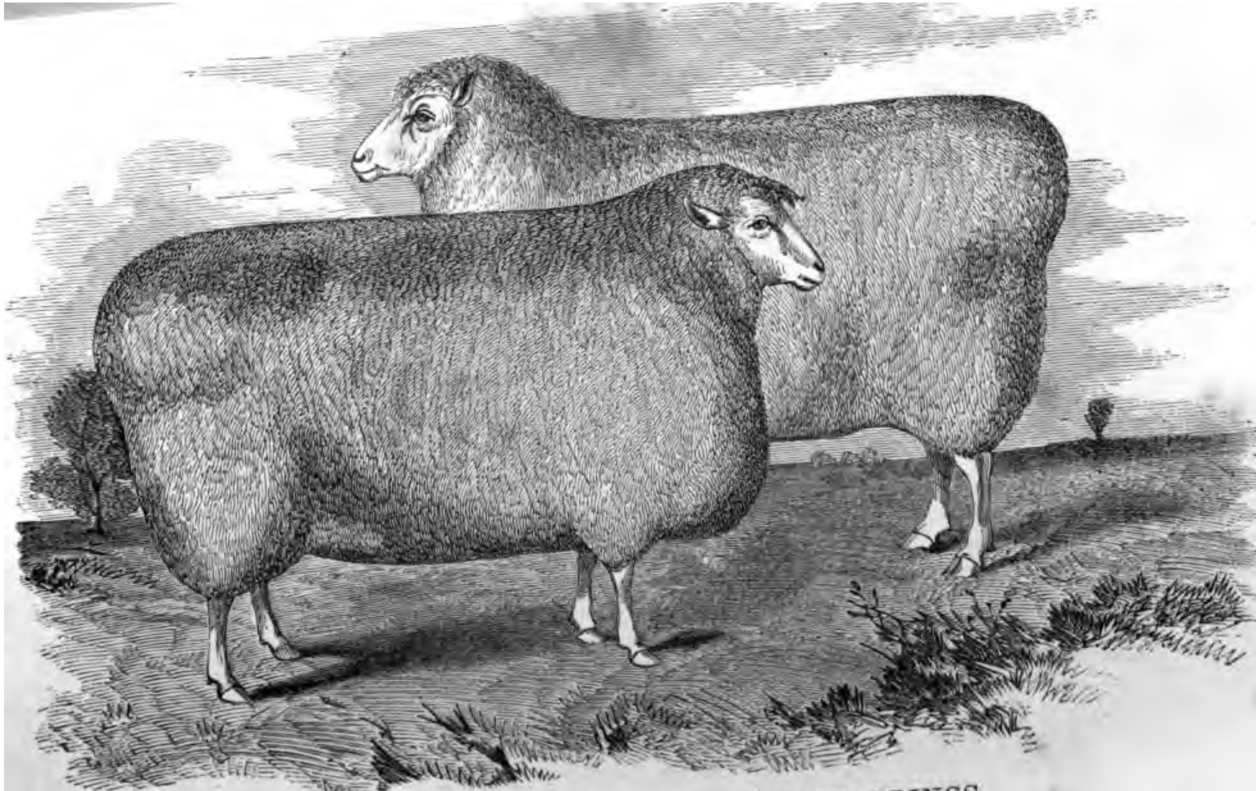
4th. Cheapness. With the exception of the main building, all the r easily be erected by an intelligent farm hand.

PLATE XXVII.



IMPORTED COTSWOLD RAM (YEARLING) "HIS ROYAL HIGHNESS."

Bred by Robert Earne, Aldsworth, North Leach, England. Imported and owned by Burdett Loomis, Windsor Locks, Connecticut.



IMPORTED COTSWOLD EWES, YEARLINGS. Imported and owned by Burdett Loomis,

... North Leach, England. ...

LONG-WOOL SHEEP.

BY J. R. DODGE, DEPARTMENT OF AGRICULTURE.

ply of fine wool in the manufacturing markets of the world is yearly and the tendency in price is downwards. The demand for long l unsatisfied, and the movement of prices for all the best styles is de-wards. The English long wools bear quite as high a price as the ustralian merinoes, and much higher than those of the Cape and of erica, which have suffered a material decline within the past year.
reasing manufacture of combing wools, the tendency towards which particularly by the writer in his "Condition and Prospects of Sheep r in the United States," in the report for 1862, is perhaps the most concerning the woollen manufacturing industry of the present day. tiful styles of ladies' goods command the admiration and patron- ionable world; and invention is almost equally rife in the pro- fancy goods from long wools for gentlemen.
the imports of woollen goods into this country amounted to $20,347,563. -fourth part was for woollen cloths and shawls. The remainder was long or coarse wools, including dress goods, blankets, carpets, and The delaines and dress goods far exceed other items, amounting to). This fact significantly illustrates our want of combing wools. In he imported dress goods of the United States have cost nearly eighteen dollars in gold, while the same item for the two preceding years did wo millions. On the contrary, more cloths and shawls were intro- 862 than in 1865.
ol quotations of commercial papers, wherever examined, test the cor- these remarks. The following are the prices quoted at the present Choice Saxony, Ohio, and Pennsylvania, 67½ to 73 cents; Ohio and alf to full blood merino, 55 to 62½ cents; Ohio and Virginia, common od merino, 47½ to 57½ cents; western merino, 45 to 57½ cents; Can- ng, 70 to 85 cents.
exion with these quotations, it is remarked that a change had occurred year preceding; that "then fine wool was in demand and the lower lected. Combing wool, however, is in as good demand as it was a nd commands as good a price." An English journal, (the Farmer's in alluding to our want of worsted wools, says "that there is great it their" (our) "worsted factories will have to be closed for want of l."
n price of Cotswold wool should not be deemed extravagant, in view that its shrinkage in scouring is but from 18 to 20 per cent., while in merino wools ranges from 40 to 70 per cent. A pound of average leece will produce as much scoured wool as two and a half pounds of co which shrinks 68 per cent.
eding of long-wool sheep, especially of Cotswolds, Shropshire, and ns, is increasing perceptibly in this country, especially in Connecticut, , Pennsylvania, Ohio, and Michigan; and the advance in this direc-

tion will be still more rapid in the immediate future. The necessity . mutton is quite as urgent as the want of combing wool, and farmers n large cities, and many even in the interior, are finding a rich profit in breeds.

A few facts from the correspondence of this department will aid in eluc the vexed question of the comparative profit of fine and long wool sheep. from speculative operations, the latter, in suitable situations and circun appear to have the advantage in the comparison.

From Cooper Sayre, of Oaks Corner, Ontario county, New York, a st concerning a flock of fifty Cotswolds, regarded as thorough-bred anim the recipients of State fair premiums, places the cost of keeping at $2 p for ewes and $2 50 for wethers. This includes five months' winter fee hay worth ten dollars per ton, and cornstalks, with one bushel of be costing twenty-five cents, and a peck of oats daily for the lambs or th His ewes average seven pounds of clean wool each, and his wethers pounds. The minimum sales of the former are not less than twelve dolla His ewes average a yearly increase (of lambs) of 120 per cent. His p buck weighed, at 18 months, 264 pounds. At the end of the first yea pects a weight of 140 pounds, 200 pounds at two years old, and from 250 at three years old, and an increase in three months feeding for m 40 pounds. He estimates the cost of care and labor, exclusive of wash shearing, at $3 each. It is an interesting fact relative to a flock of t that the loss is but three per cent.

An interesting exhibit of the debtor and credit sides of a flock of South is made by Ralph H. Avery, of Canastota, Madison county, New York. the average yearly cost and produce of his flock as a basis, he estimat flock of ten ewes as follows, with $19 10 each as a comfortable balance

EXPENDITURES.

Ten ewes, at $30 each	$
Interest on stock	
Pasturing 6½ months, at $2	
Winter food 5½ months, at $3	
Salt, $1; washing, $1; shearing, 50 cents	
Labor for winter care	
Average loss by accident or disease, 2 per cent	

RECEIPTS.

Ten ewes, worth same at end of year	$
Fifty pounds of wool of ten ewes, at 50 cents	
Fifteen lambs, at $15 each	
Value of manure	

Leaving a net profit of....................

He writes further as follows: "My sheep are usually sent to pastu the first of May, and put into winter quarters about the middle of No making six and one-half months in pasture. During the summer and a aim to prevent them from becoming too fat, which I find a very difficult In this they differ from any other breed which I have kept. My or during the season at pasture is to put tar upon their noses two or thre

upply of salt once a week. I deem it very essential that sheep have
upply of pure running water the year round. When put into winter
ich consist of a warm shed open on one side, a tight, warm, and dry
ys well bedded with straw, and well lighted and ventilated, and an
a which there is a trough constantly supplied with water brought
g, they having free access at all times to all the different depart-
eir instincts lead them. They are regularly fed three times each
over hay, cut when first in bloom and cured mostly in cock, so as
he leaves, color, and flavor as entirely as possible. Occasionally at
on cornstalks, wheat, oat, or bean straw, for a variety. No grain
fed at any time. I, however, think a few roots, regularly fed, would
to their health. My sheep, thus kept, are always healthy and in
n. I never lose any except by accident.
horough trial of several breeds of sheep, I consider the South Downs
fitable for wool and mutton combined, for this section of country.
ss, early maturity, and easy fattening qualities, together with the
lity of their mutton, they are not equalled. In other sections of the
r breeds might be preferred."
ness of the Cotswolds is well illustrated by the fact that they live
s far north as the Ohio river without other food, summer or winter,
ural grasses of the meadows and forests. It is a common experience
and a well attested fact in Missouri, Kentucky, and Virginia. An-
re, writing from Stewartstown, Missouri, of his flock near Maysville,
ays:
52 (the year I made my first importation) to this date, my sheep
een fed, either in winter or summer, but live bountifully the year
e grass pasture alone. With this treatment I have suffered serious
ewes becoming too fat for breeding and compelling me to consign
butcher. I have never owned a common sheep for breeding pur-
ave I ever handled anything but Cotswolds, except a few Downs,
y for a short time. All I know of other breeds is from observation
ls, and from this I have been satisfied to breed the Cotswold sheep
The South Down is a great favorite with me, and has some ad-
r the Cotswold, while laboring, at the same time, under some great
s."
f the sheep-breeders of Kentucky writes: "I have not fed my sheep
nd they are in fine order. We never feed unless the ground is
snow six inches or more."

Messrs. S. & S. W. Allen, Vergennes, Vermont, sends the following statement, embracing long and short wool breeds:

Expenditures.	*Merinos.*		*Leicesters.*
Interest on 10 ewes	$60 00		$20 50
Pasturing six months	9 00		12 00
Winter feed six months:			
2 tons of hay, clover, and herdsgrass	20 00	(2½ tons hay)	25 00
6 bushels of corn	7 50		7 50
12 bushels of oats	6 00		6 00
12 bushels of carrots and beets	3 00		3 00
Salt, ½ bushel	50		50
Washing			50
Shearing	1 00		1 00
Labor	2 00		2 00
Average per cent. annual loss by disease, dogs, &c	10 00		5 00
	119 00		83 00
Receipts.			
Wool, 100 lbs	50 00	80 lbs	52 00
10 lambs	500 00		150 00
Manure (summer)	2 00		2 00
Manure (winter)	3 00		3 00
	555 00		207 00
Profit	436 00		124 00
First year's average growth of lambs	50 lbs.		75 lbs.
Second year's average growth of lambs	20 "		25 "
Third year's average growth of lambs	10 "		25 "
Weight at 3 years old	80 lbs.		125 lbs.

It will readily be seen that this flock of merinoes commanded speculative prices. It would scarcely be adviseable to stop breeding American merinoes so long as purchasers eagerly demand them at the rate of $100 each for ewes and $50 for lambs. But when both breeds are sold at the same price, and held for wool and mutton alone, what will this comparison show? It is worth noticing, that the amount of corn, oats, roots, salt, and labor is the same, and that the only extra expense of the Leicesters is for half a ton of hay at five dollars, and three dollars more for pasturage; ten merinoes costing, for feed and attendance, $4 90 each, and ten Leicesters $5 75 each—a difference of about fifteen per cent. in favor of the former. To counterbalance this, the wool of the Leicesters yields two dollars more per annum, and their superiority in mutton is equivalent to 45 pounds in three years, or 15 pounds per annum. For the purposes of mutton and wool, then, this sh[illegible] decidedly favors the ten Leicesters, which [illegible] mutton, worth $15, and $2 more in wool, [illegible] extra cost of keeping, leaving a dif-[illegible]

[illegible] a flock of 160, makes the average cost [illegible] $41 40, and of the same number [illegible]—$42 40. The merinoes yield [illegible]ross-breeds 96 pounds 14 ounces. [illegible]oint of profit; but the mutton as- [illegible] the South Down blood. The cross- [illegible]hirds of it the first year; the merino [illegible] first yea[illegible] one-fourth each year of the remain- [illegible]urity, the size is larger and the price

pound greater in the market. These points increase, very materially, the parity in mutton production, while the cost of keeping is very moderately ıanced. Recent speculative prices of merino lambs constitute the only ele- nt of superiority, in point of profit, which may temporarily counterbalance e superior profit from mutton production in the cross-breds.

Several statements have been received from owners of merino flocks, (most them thorough breds,) which exhibit a wide range of expenses and balances rofit, depending upon the price of feeding material, the length and severity winter, and somewhat, also, upon the liberality of the feeder. They rep- sent the different sections of the country, and a wide range of prices of sheep. exhibits, averaged, give the following results: Average price of ewes, 40; wool of ewes, 6¼ pounds each, worth $3 86; average cost of keeping er annum, $2 65; percentage of lambs to ewes, 80. This is about the aver- ge prolificacy of this breed throughout the country, while Cotswolds will proba- ly average 120, and South Downs still more. So far as indicated by state- ents received at this office from American breeders, founded on their own xperience, South Downs would average 150 per cent. Probably the actual verage throughout the country would be somewhat less. The exhibits of ong-wool flocks, as shown in the preceding statements embracing both long nd short wools, and in many others of a general character, indicate a smaller lifference in their cost of keeping than is generally believed. Long wool sheep, f course, require more feed than small breeds, but they are of earlier maturity nd more easily fattened, retaining the fat in the carcase instead of excreting t in the wool.

The original data, briefly analyzed above, illustrate conspicuously the favor- e influence of the milder climate and abundant herbage of the central blue- s regions upon the thrifty long-wool breeds. So suited are they to this e, that in Kentucky, for instance, South Downs and Cotswolds are the avorite breeds, and many of the best farmers could scarcely be induced to ex- hange for fine wool sheep, however great the temporary advantage promised. To illustrate this difference in expense of feeding in different sections, and to how the money value of climate to sheep breeders, the following statements re given, each presented as the actual quantity and value of feed consumed ten merino ewes:

G. S. Center, South Butler, Wayne county, New York, pastures six months, t a cost of $15, and feeds six months, clover and timothy hay, worth $20 per and corn at $1 50 per bushel, costing $50; salt, 50 cents. Total cost of $65 50.

Charles M. Clarke, Whitewater, Walworth county, Wisconsin, pastures six s, and feeds six months upon clover and timothy hay, at ten dollars per on, and corn and oats at forty cents per bushel, costing for the year, $46 80.

E. Findley, Ottawa, Illinois, pastures eight months, at a cost of $4 60, and ds four months six bushels of corn, worth $1 80, and one pound of hay each day, worth $8 per ton, or $4 80 for what is required—altogether costing, ncluding salt, less than $12.

Facts like these are directing the attention of wool-growers to the milder limates of Maryland and Virginia, as well as to Kentucky and Missouri, and o the mountains of Tennessee and the plains of Texas. The entire Allegha- ian region is unsurpassed for profitable sheep husbandry. The writer of this, ı his volume upon "West Virginia," refers to the fact, that in Hancock, Brooke, nd Ohio counties, in that State, there were in 1860 as many sheep as acres of nproved land—a proportion to acreage eight-fold greater than in Ohio, the first 'ool-growing State in the Union; and says of the highlands: "The mountain gions are unexcelled as sheep walks, and are beginning to be improved as ı. * * * The mildness of the climate and excellence of mountain res are conditions favoring the production of the best quality of wool.

For sweetness and flavor, the mountain mutton of Virginia is deservedly celebrated. The production of fine spring lambs, of South Down or Cotswold blood, for the markets of the eastern cities, would prove here a most profitable business."

This mountain-fed mutton, fattened upon grass alone, has long been noted in Washington and Baltimore. In a private note from Paul McNeel, of Pocahontas county, (near the summit of the Alleghanies,) whose flocks formerly numbered 900, mostly common sheep, and who acknowledges sheep husbandry to be more profitable than the production of cattle, horses, and mules, the following illustration of the above fact occurs:

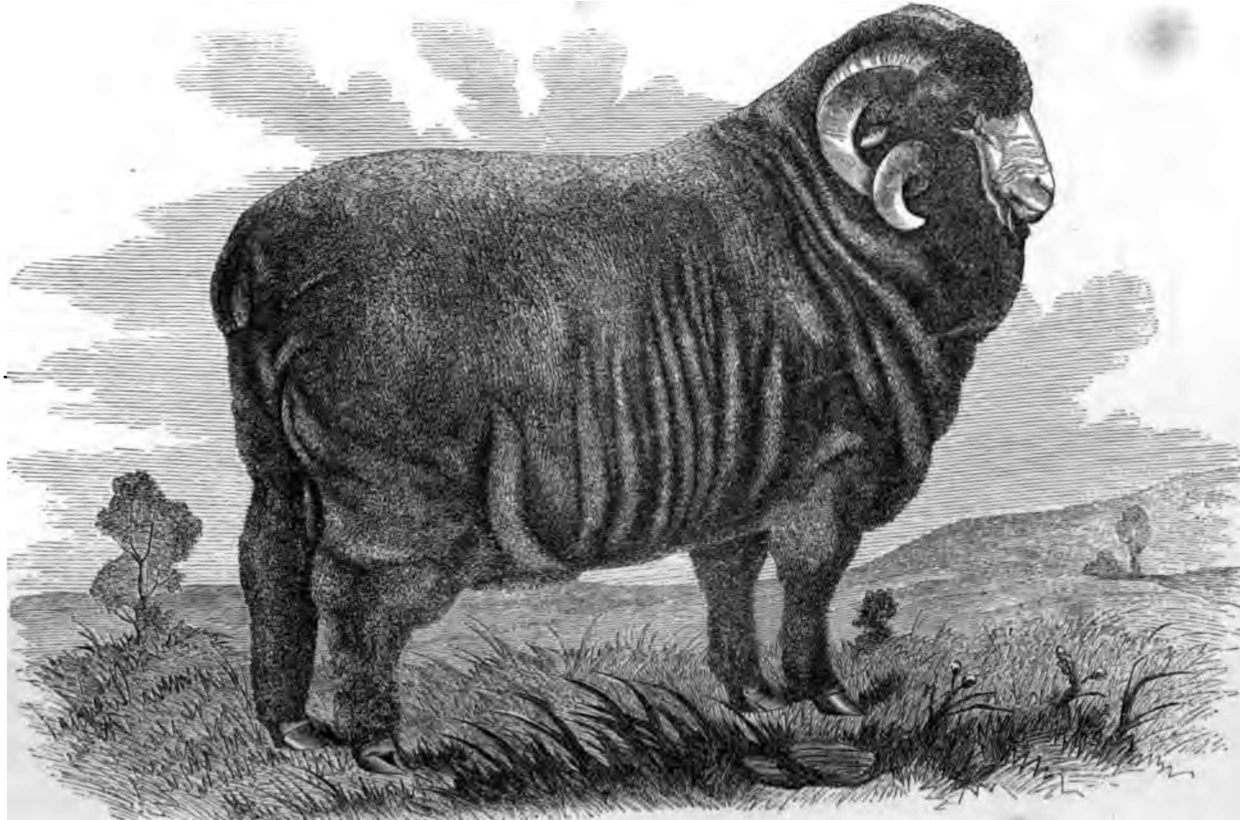
"I began with 500 or 600 sheep about the year 1830. In buying, I bought such as I could fatten the next year for the White Sulphur Springs. I suppose I furnished from 300 to 500 head each year for more than twenty years; and Mr. James Caldwell, the proprietor, told me the best muttons he bought were purchased from me. Old General Wade Hampton and Mr. Singleton, of South Carolina, built summer residences at the springs. I frequently met them, and they always asked me about my sheep, and what I did to make them so fat and the flavor of the mutton so good."

Thousands of merino sheep have recently been introduced into Virginia from the north; but the long wools, among provident and thrifty farmers, are preferred; and it is evident that the central and southern latitudes will compete successfully with more northern locations for the supply of the worsted wools of the country.

THE AMERICAN MERINOES OF VERMONT.

The increasing interest manifested of late in the breeding of pure blooded fine-wooled merino sheep indicates that the progress in sheep husbandry, which has been most remarkable during a quarter of a century past, is destined to continue, and that the growth of fine wool is to become one of the leading interests of this country.

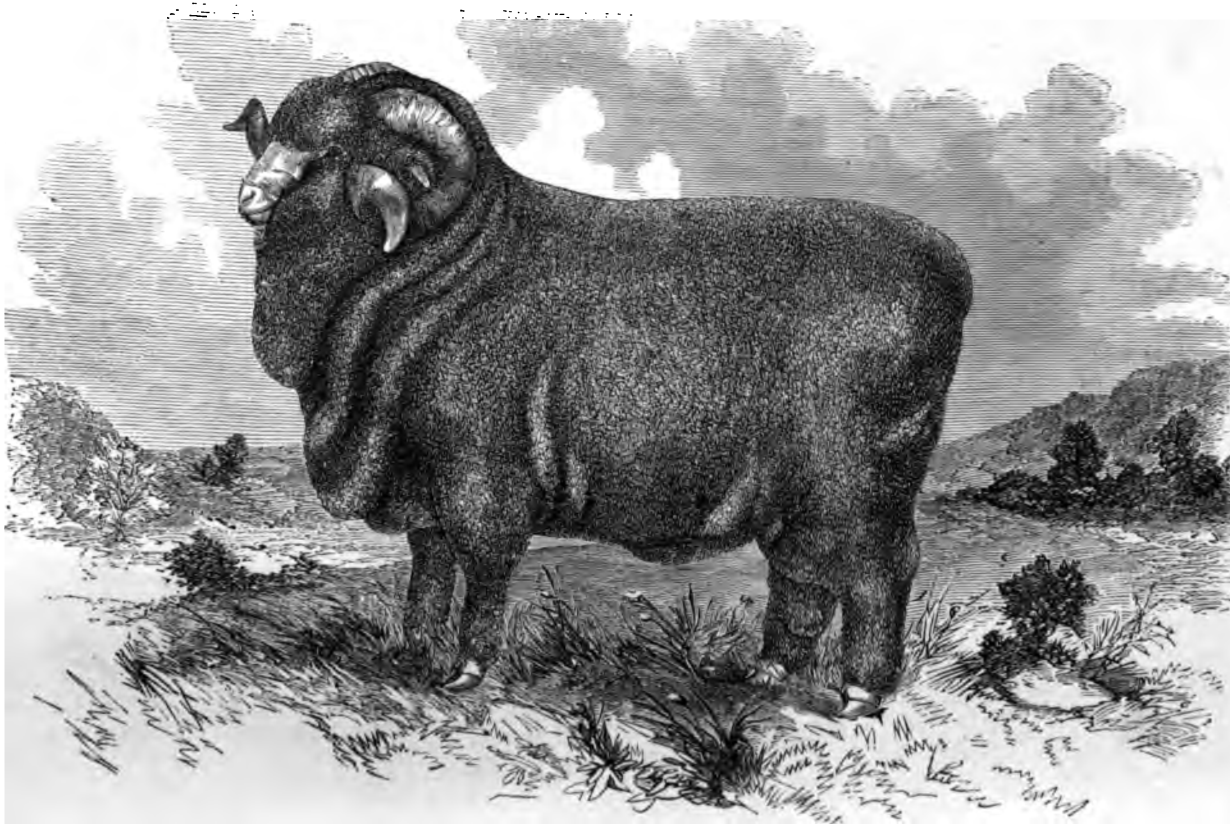
Nowhere has there been felt so much general interest in this subject as in the State of Vermont. The Spanish merino was introduced here early in the present century, and by the judicious and careful breeding of more than forty years has become a far more perfect animal than when first imported, combining a heavy fleece of fine texture with a vigorous and healthy constitution, adapted to a northern climate, which the less hardy Saxons were unable to withstand. The flocks ot such gentlemen as Edwin Hammond, of Middlebury, William R. Sanford, of Orwell, Rollin J. Jones, of Cornwall, E. S. Stowell, of Cornwall, Geo. Campbell, of Westminster, John T. Rich, of Richville, and others in Vermont, have made the thorough-bred merino sheep celebrated throughout America. Animals from these flocks are eagerly sought from all portions of the country, and at prices almost fabulous to those not familiar with the facts. Rams from one to three years old are sold at from \$1,000 to \$5,000, and in some cases \$10,000 has been refused for a single animal. The owner of a superior ram frequently received from \$2,000 to \$3,000 for his services in one season, besides using l 'n his own flock. Ewes are sold at from \$100 to \$1,000. Hon. Rollin J. Jones, ' West Cornwall, Vermont, sold his entire crop of ewe lambs in the season of '5 at \$100 per head when five months old. The subjoined statement shows



"SEVILLE," INFANTADO RAM, TWO YEARS OLD.

"OPHIR." INFANTADO RAM LAMB.

Bred and owned by Rollin J. Jones, West Cornwall, Vermont.



"MAJOR." INFANTADO RAM.

Weight of fleece, 23½ lbs. The Property of Deardorff, Waller & Co., Tuscarawas County, Ohio.

MERINO EWE TEGS.

t of fleece and weight of carcass, respectively, at a public shearing of
›s, given by the purchaser, at West Cornwall, Vermont, May 23, 1866:

r.	Weight of fleece.		Weight of carcass.		Number.	Weight of fleece.		Weight of carcass.	
	lb.	*oz.*	*lb.*	*oz.*		*lb.*	*oz.*	*lb.*	*oz.*
......	9	10	69	12	25............	11	14	46	2
......	11	14	56	4	26............	10	12	56	14
......	11	8	46	4	27............	9	6	60	0
......	9	8	60	14	28............	12	10	48	0
......	12	6	62	6	29............	10	14	57	6
......	10	6	49	14	30............	9	12	48	10
......	10	9	59	10	31............	9	4	50	8
......	11	6	71	4	32............	10	2	64	0
......	12	6	46	6	33............	13	0	61	8
......	11	10	52	6	34............	11	10	58	14
......	10	8	46	0	35............	13	0	43	8
......	10	12	61	4	36............	11	14	54	14
......	10	6	46	10	37............	12	12	56	4
......	9	10	47	4	38............	9	14	61	15
......	12	6.	68	14	39............	12	12	54	2
......	12	8	57	14	40............	11	2	62	10
......	11	6	53	0	41............	11	2	68	14
......	11	12	65	4	42............	11	4	56	14
......	9	12	66	4	43............	11	8	42	14
......	11	6	66	2	44............	12	0	67	4
......	12	8	49	4	45............	11	4	59	6
......	12	8	45	0					
......	11	14	46	12	Total......	508	10	2,515	3
......	12	8	53	4					

ight of carcass after shorn, forty-five ewes, 2,515 pounds, 3 ounces.
weight per head after shorn, 55⅘ pounds.
weight of fleeces, 11 pounds 5 ounces.

lambs, like most of the principal flocks of pure bred merino sheep in ;ounty—the leading sheep-growing county in the State—were descend- ıe Spanish merinoes of the importation of Stephen Atwood, of Con- and now generally known as the Infantado stock.

m lamb Ophir is a most perfect specimen of what long continued effort ement can accomplish. He was but ten months old when his portrait ı. The ewes of the best flocks, when matured, shear from ten to fifteen ıch; the ram from fifteen to twenty-five pounds, unwashed, and they ally shorn in April or May, when the weather is cool and the fleece less it would be later in the season, at the ordinary time of shearing.

ımber of breeders of fine sheep is rapidly increasing. Competition is l we may look for a still further advancement in the excellence of flocks re general dissemination of the American merino through the United ring the next decade. The addition to the material wealth of the coun- s event can scarcely be estimated, as, with the requisite protection by ıs tariff, the American breeder can be confidently assured of ample and ; remuneration.

:ople of Texas were becoming considerably interested in sheep hus- nd the breeding of improved stock when the late unhappy rebellion d their intercourse with the north, and even since the close of that have again commenced visiting Vermont with a view of purchasing l engaging anew in the prosecution of the enterprise. The soil and

climate of Texas are favorable to the breeding of sheep, and we look to see "Lone Star" become one of the leading wool-growing States of the Union.

Several of the best flocks of Vermont will be represented at the exposition at Paris in 1867, and a still greater triumph for the American breeder than that achieved at Hamburg a few years since may be expected. We hope to see it fully demonstrated that the pure bred American merino has no equal on the face of the globe.

CATTLE FARMING IN THE PAMPAS.

BY REV. G. D. CARROW, LATE SUPERINTENDENT OF THE MISSIONS OF THE METHODIST EPISCOPAL CHURCH IN SOUTH AMERICA.

There are two classes of men (discoverers by land and sea, and pioneers in new fields of tillage and commerce) who, though almost invariably distinguished for great and good qualities, seldom realize an adequate return for their services to their country and to mankind. The truth of this statement is confirmed by many facts belonging to the history of the discovery and colonization of this continent. Were we not so strongly assured of the contrary, we might suppose that the discovery and exploration of the three greatest rivers of this continent, and of the globe, were events certainly calculated to insure solid comfort to their authors during the brief period of their mortal life, as well as immortal fame on the pages of history.

What are the facts which so sternly forbid this natural supposition? Fernando de Soto was the first white man who explored the banks of the Mississippi, and saw that "father of waters" roll beneath the boughs of the primeval forest to the sea. But only a few days after his passage of the mighty he had ceased to live; his body, to conceal his death from his enemies, was wrapped in his mantle, and, at the hour of midnight, was silently sunk in the middle of the current. "The wanderer," says Mr. Bancroft, "had crossed a large portion of the continent in search of gold, and found nothing so remarkable as the place of his burial." Francisco de Orellana, striking a stream that wound itself along through the rugged passes of the Peruvian Andes, built a mere raft of green wood, launched it, and drifted with the current. Onward it bore him through plain and forest, mountain gorge and fertile valley, ever growing deeper and wider, till, at the end of seven months, and at a distance of four thousand five hundred miles, his frail and rudely constructed vessel felt the heaving, and his experienced eye surveyed the great expanse, of the Atlantic Ocean. He called the river *Amazon*. Marvellous was the adventure, and immortal the fame. But, ten years later, the discoverer perished in an expedition [illegible] o locate and furth[illegible] xplore the river, whose course he had follo[illegible] [illegible] rth i[illegible] he mountain[illegible] ts death in the sea.

[illegible] sing the equator, and steering boldly to the [illegible] sweep northward from the latitude [illegible] d to be the mouth of a great river, [illegible] its sands, called it *El Rio de la* [illegible] after the discovery, he was [illegible] [illegible] plorers were in search of the prec[illegible] [illegible] career in poverty and disappo[illegible] [illegible] able advantage from their [illegible] [illegible]

l sufferings. Harvests of grain and cotton are now gathered in the valley of Mississippi more valuable than the produce of the mines of Potosi. Har-ts of fruit, corn, and cotton are to be gathered in the valley of the Amazon rth more than all the gold that streaks the mountains whence that river flows. : from the far-reaching plains of La Plata's basin, supplies of meat and caing might be drawn in quantities sufficient to meet the necessities of more in half the world. The pampas form the larger portion of that great river's sin. Of their wool-producing capabilities, and of the extent to which they already laid under contribution, the writer has given some account in the port of 1864, Department of Agriculture. In the present communication his rpose is to give to agriculturists of the valleys of the north some information the subject of *horned cattle breeding* on the great plains of the South Amer-an continent.

THEIR ORIGIN.

There were no horned cattle either in the northern or southern division of this ntinent prior to the discovery. The first ever seen in the new world were im-rted by Columbus in 1493. Respecting their importation into the northern ction of the southern continent, Lieutenant Gibbon, in his Exploration of the y of the Amazon, says: "This pampa looks like a great pasture field, sed by the Mamoré ditch on the south, and the Securé on the north. Under shade of the trees stand the cattle of the field. They have gradually clam-red over the Cordilleras from the flats of Guayaquil, through the table lands Oruro, and from the salt district of Charcas. The creoles drove them down the side of the Mamoré river, and let them out into the grassy prairie lands Chiquitos and Mojos. When the cattle came among the Indians they knew t what to make of them. There were no such animals in their wild lands. he fierce tiger, and the poisonous serpent which they worshipped, were out-ne. The cow interfered with the belief they previously had, that the largest imals were God's favorites, particularly those which had the greatest means active aggression or self-defence. The cow helped to change such a religion. degrees they learned that she neither bit, clawed, nor stung; that she car-d a bag full of milk; that her teeth were given her to cut the pampa grass, d not to devour the flesh of a human being; that she was docile and friendly man, and not his enemy. The Jesuits (missionaries) taught the Indians how milk the cow and how to use her milk. They soon learned how to tend cat-, to lasso them, to yoke them by the horns, so that they may drag along a ndle of drift wood from the edge of the river to the middle of the plain. In s way they kept cattle near them, while herds roamed through the pampas, e wild, and are now so scattered through the lands that it is difficult to t them." The pampas described in the lieutenant's report form the cen-l and southeastern departments of the present republic of Bolivia, and he is ibtless correct when he states that the first horned cattle introduced into that t of the continent came from the Pacific coast. In 1551 horned cattle were brought into Paraguay from the coast of Brazil. These Sir Woodbine nsh regards as the progenitors of the numberless herds that for three cen-ies have roamed the southern plains. For the original importation Paraguay s, doubtless, indebted to the Jesuits, as was that country, and, in fact, the ole interior of the southern continent, for almost all the elements of their ly civilization. Sir Woodbine is mistaken, however, in asserting that the ole pampas stock originated from the breed imported into their mission unds by the Jesuits of Paraguay. Prior to the date to which that importa-l is assigned, settlements of Europeans had been effected in southeastern l, and the colonists, as Mr. Gibbon suggests, had brought cattle with them the west coast. The present stock, therefore, may be regarded as the com-ea results of two original importations, one from the Atlantic and the other

black, and dark brown. Steers frequently attain a fine size, are ver cal in their proportions, and when broken to the yoke and put to gentle in their dispositions and rapid and graceful in their motions. to the qualities of the cows for the production of milk, but little can certainty. On the cattle farms milk is but seldom used, and so litt is paid to the cows that are kept by milkmen for the purpose of su towns and cities, that the quantity of milk they yield cannot be tal sample of their natural capabilities. The milk itself is very rich excellent flavor. The town and city traffic in that article is som worthy. Certain police regulations are made to prevent adulteratio are not very effectual. Every few mornings quite a troop of milk may be seen in line before the door of the police officer, and after d tion, the charge of adulterating being brought home, the contents are condemned and confiscated. But the adulteration of milk, like ation of whiskey, is found to pay so well that the rogues can afford penalty of the law quite as often as a policeman can be found shar

it might prove successful there beyond precedent in those countries ›y crossing and careful treatment, stock has been brought to its highest ›f perfection. If the writer mistake not, there is a handsome fortune in any intelligent, enterprising cattle farmer who would go to that country est a moderate capital in the improvement of native stock, both for : supply and foreign exportation.

A CATTLE FARM.

stancia, or cattle farm, varies in extent from one thousand to fifty d square leagues—the square league containing five thousand seven . and sixty English acres. In the districts adjacent to the cities and ,nd in those which lie upon the margin of the Plate and Parana rivers, :e rapidly taking the place of horned cattle. The largest estancias for ı fact, are now to be found only in the interior, and in such sections as 'rom the great water-courses. The cattle farms abound in what the distinguish as *strong* grasses. These coarse grasses gradually disappear ɜr the land is appropriated to sheep. In their place there comes a rich ɔf smooth-stalked meadow grass, (*Poa praténsis,*) and meadow foxtail, *urus.*) Horned cattle, like sheep, prefer these, but thrive very well on the vild barley, and other varieties of coarse grass which abound throughout ıs. The coarse grasses are more hardy, and stand the dry season better finer ones, but contain less nutriment; and while stock fed upon them ervêd in a healthy and plump condition, they neither fatten so quickly bundantly as when favored with their choice pasture. Pasture is most ıt in winter, the rainy season of that climate, and of best quality during ths of summer and autumn.

single estancia is frequently pastured a stock consisting of a hundred d head. The general herd is divided into smaller ones containing, each, ree to twelve thousand. A herd of three thousand can be properly r by one man. The entire herd is collected every evening at a spot farm-house. This gathering place is called, in Spanish, *rodes.* And ked peculiarity to be observed when the stock has been assembled for ıt is, that each animal is careful to select precisely the same spot on laid the night before, and every night, probably, since it took its place ts full grown companions. The immense herd will all lie or stand tohus, each in its own place, without enclosure of any kind, and will not for the day's grazing until eight or nine o'clock in the morning. Cows .ce a year; heifers as early as two years old. With regard to the lon›f horned cattle, no exact information can now be obtained. Farmers t recorded nor perhaps even made any observations on that subject. In ion of Mr. Van Blarcom, (an experienced and intelligent observer,) the age of animals may be set down as fifteen or twenty years. Neither ›rietors nor the men they employ will eat the flesh of an old cow or ıd as stock is not bred to any extent either for milking or labor, there is ɜement to preserve animals till they have grown old, especially as the ınd younger cows are preferred for the purpose of breeding. For these but very few animals are allowed to grow old; and such as receive this ɜ are permitted to die of neglect, or are killed for the hide and tallow, ass being thrown to the dogs and buzzards.

cure comfort and success in cattle breeding, water is a prime consideraThe most desirable land, therefore, for this purpose, is that which is in those slightly undulating districts of the great plains where large f water collect during the rainy season. These, however, evaporate in ɜes during the heat of summer, and water must be obtained from wells. ı where care had not been taken to provide a sufficient number of these,

great destruction of stock has sometimes been the consequence. In the provin of Entre Rios, in 1846, there was a general drought, unusually prolonged an disastrous. The grass was literally reduced to dust. Cattle, suffering thirst, wandered off from their accustomed pasture grounds in search of foo water. Some farmers lost five thousand, some ten, and some as many as thousand animals. It is stated, indeed, and is doubtless true, that one *estancien* an English gentleman, lost one hundred and fifty thousand head. In seasons of protracted drought cattle will stray in quest of water hundreds of miles If they find water, and remain long enough in its neighborhood to calve, they will never return. But if the drought ceases before they calve, they will return to the grounds of their owners. Protracted droughts are not of frequent occurrence; and yet they are sufficiently so, one would think, to induce the farmers to adopt all suitable precautions. The immigrant farmers do provide well sufficient to meet ordinary exigency. But the native proprietors in this, as in all things else, are disposed to take the world easy, and are perfectly willing that the morrow should provide for itself, or even prefer that it should be of disaster rather than to-day should be devoted to care and toil. Besides this, native labor is exceedingly scarce. The great pampas are very sparsely populated, and the necessaries of life are so cheaply and easily obtained that few who are dependent upon their own exertions for a livelihood will do but little work. In one particular, both foreign and native proprietors are alike to blame. Dependent as they frequently are upon their wells, they have not adopted any modern improvements for pumping water. The horse-bucket system still prevails. An author very familiar with the modes and customs of the pampa cattle farmers thus describes the process: "Over the well is a framework from which is suspended a pulley through which a rope is passed, one end being secured to the bucket and the other fastened to a horse. The bucket is made of hide, very long, and of a peculiar form; the adjustment of the rope is so secured that when the horse reaches the extreme length of the rope the mouth of the bucket leans into a cistern or trough, into which it empties itself. By this primitive and tedious process it takes one man and two horses eight hours to water two thousand head of cattle. So if there should be only fifty thousand head on a particular farm, (and there is frequently double that number,) it would require a day's work for twenty-five men and fifty horses to give the entire herd a single drink of water.

There is one custom peculiar to horned cattle which the natives call *standing rodes*. The explanation is this: if one farmer lose a herd, or any portion of one, and sets out in search of the missing animals, every farmer he visits in the course of his search is required by an ancient law, enacted expressly for that purpose, to drive up his herd for the inspection of his unfortunate neighbor, that he may see whether he can identify any of his lost animals. This is what is meant by standing rodes. In a country where there are no fences, and causes are constantly occurring that tend to scatter the herds, it will be perceived that the l[illegible] in ques[illegible] [illegible] proper and necessary.

[illegible]

[illegible] fences [illegible] any kind to separate adjoining [illegible] must [illegible] with [illegible] mark of its owner, so that in case [illegible] rode, or other causes producing an [illegible] confusion, each proprietor may distinguish and [illegible] patterns of the various marks or brands adopted [illegible] of [illegible] departments are preserved in the office of the [illegible] of the parties that use them; and to counterfeit or [illegible] offence of the same grade as forgery, or the counterfeiting [illegible]

The season of marking is one of great sport for the young men and boys and 'n the girls of a family. It corresponds, in its way, to the corn-huskings and iltings that were so highly appreciated and keenly enjoyed by our grand-bers and grandmothers. The process is very simple. The cattle are driven a large pen; a man or half grown boy mounts a horse; the Spanish saddle iastened very strongly with stout and broad leather straps; in the central p, about half way between the horse's back and belly, there is an iron ring; this the *lasso* (a strong, plaited raw-hide rope) is attached; the other end is d into a noose which the rider throws over the horns of the animal, and norse dragging it from the herd its legs are then securely fettered, and being ɪwn upon its side the red-hot brand is produced and the owner's mark is ed indelibly upon its smoking flesh.

ɪne catching of a single animal for domestic use frequently presents an ex-ig scene. The particular one desired is singled out, and perceiving itself)y instinct it frequently does) to be the object of some dangerous design, it s from the herd and bounds off into the plain. The horseman, duly quipped with a lasso, clasps the spur to his steed and bears down upon the g fugitive. Having gained a point within convenient distance, he swings lasso several times around his head to give it momentum, and then throws noose around the horns of his victim. This is done while horse and steer at the top of their speed. The moment the noose lodges on the head of the r the horse stops and wheels to receive the shock, which is often so violent t the animal is thrown headlong and bellowing to the ground. The precision h which many horsemen throw the lasso can hardly be conceived by one not iar with the customs of that country. The Indian's arrow or tomahawk rcely speeds more directly to its mark. The performance is to be explained s are all the feats of human dexterity. Early training and long practice sup-ly the horsemanship, the steady hand, and the unerring aim. The lasso is the ative child's first toy; and one of his earliest amusements is found in throwing s noose over the heads of the dogs, cats, and tame sheep that follow him about is play grounds.

Another method of catching cattle is with the *bolas*. This instrument is repared in the following manner: Three round stones or iron balls, each the ze of an egg, are covered with raw hide; one is fastened to each end of a rked strip of hide, about ten feet long; the third ball is secured to a strip, hed to the main one, about five feet long. The horseman takes this in his and, and, as in the former case, pursues the animals. When he comes within sy reach of his object, he takes hold of the end of the rope, and swinging the her that has the balls attached several times around his head, throws the whole ntrivance at the animal's legs. In an instant it is entangled, and the more it ideavors to escape the more securely it is fettered till it falls. The *bolas* may thrown fifty or sixty yards with certainty; and if the pursuit be rapid, the etness of the horse adding force to the throw, an animal may be struck with lerable precision at a distance of eighty or ninety yards. An ordinary herds-an, or other laborer, receives per month from twelve to twenty silver dollars. he entire estancia, with all its arrangements, is placed under the superintendence an experienced and well tried "major-domo," whose salary differs, according the wealth of the proprietor and the responsibilities of the situation, from to five hundred Spanish dollars per annum.

PREPARING FRESH BEEF FOR MARKET.

In killing cattle for home consumption the butchers first hamstring them and cut their throats. In dressing them they are not suspended, but flayed on e ground. Some years ago the Buenos Ayrean city fathers prepared a slaughter-e of the same style and conveniences as are common in other countries, but

the butchers refused to occupy it, and steadfastly adhered to the old custom of hamstringing and throat-cutting in an open pen. The carcass is divided in a mode somewhat peculiar. The tenderloin is taken out and sold by itself. [illegible] is never weighed in market, nor even measured, except by the butcher's eye, [illegible] acquires great exactness in subdividing the quarters of an animal so as to [illegible] the pieces suit the daily, bi-weekly, or tri-weekly demands of his cu[illegible] The beef market of the pampas was in former years probably the che[illegible] in the civilized world. So recently as twenty years ago an ordinary cow or [illegible] could be bought for one silver dollar, and a large fat steer for two dollars [illegible] half. Now, the prices of the same animals range from eight to twenty dollars. In 1858 a piece of sirloin, weighing ten pounds, could be purchased in the markets of Buenos Ayres or Montevideo for fifty cents, and in the towns of the interior for half that sum.

The natives are very partial to roast beef, which they term *asado;* but their mode of preparing it is peculiar to themselves. They take the best ri[illegible] pieces and cut away the flesh till the rib is reduced to nearly the thinness of [illegible] ordinary sparerib of pork, according to our method of butchering. This is [illegible] to suit their mode of roasting, which is never in accordance with that w[illegible] obtains in Paris, London, or New York. Instead of the oven, they still use [illegible] more primitive spit. This is a piece of iron about four feet long. It is [illegible] through the meat, and, if the meat be prepared in the open air, is stuck int[illegible] ground at such an angle as brings the meat into contact with the tip of the fl[illegible] or, if the meat be prepared in the kitchen, the spit is inclined against the chi[illegible] in about the same position. The fire is kindled with weeds or small dry f[illegible] cut from the paradise or peach tree. As this consumes very quickly, fresh [illegible] is constantly supplied. When the fat of the flesh ignites and blazes, the cook seizes the spit, blows out the flame, and then returns it to its place. This is repeated till the meat is nearly done, when the spit is laid across two large bricks, and the process of cooking is completed by toasting a few minutes over the fresh coals. Meat cooked in this way is somewhat smoked and a good deal blackened, but it has a juiciness and a peculiar flavor which could not fail to commend it to the palate of a finished epicure.

Some travellers complain of the toughness of the native roast, but the writer's experience is altogether in conflict with their statements, and his impression is that they must have fallen into the hands of a very unskillful cook, or upon the carcass of an animal that had been toughened by poverty and leanness or unusual length of days. The qualities of the beef are very superior. English residents, generally, do not esteem it; but this is owing to that intense national egotism from which few, even of travelled, Englishmen ever entirely recover. They will roundly assert that neither first-rate beef nor mutton can be found beyond the limits of the British isles. But many Americans, who have travelled extensively on both continents, consider the best pampa beef fully equal, if not a little superior, to the best beef ever brought to an English market. It has not the same amount of fat, nor is the fat so thoroughly distributed through the lean portions of the carca[illegible] sufficiently [illegible]at to meet the demand of any delicate and well-educate[illegible] The *tissue*[illegible] are so fine as to render the flesh [illegible] flavor akin to that which distinguishes [illegible] the flock which is hatched in the [illegible] It is also very easily digested. A [illegible] as the appetite of a hungry man [illegible] indulgence. Pampa beef, as well [illegible] prescribed for all invalids suffering from dyspepsia, [illegible] and blue devils.

JERKED BEEF.

An establishment for preparing this is called a "*saladero*"—literally, salting The mode of slaughtering the cattle and preparing the beef is very simple. n the case of "marking," the herd is driven into a large pen. A man or , with a lasso attached to his saddle girth, throws the noose around the horns animal. The lasso traverses a pulley, suspended from a cross-beam on two strong upright posts. The horse draws the head of the animal ly up to the beam where a man or boy sits with a long knife. The moment touches the beam the knife severs the spinal cord just back of the and the animal drops on a movable platform which runs on a tramway, is immediately drawn out of the pen by hand and placed under an open d, where two men, without hanging the carcass, quickly flay it right and left; others take out the intestines, cut off the head, divide the trunk into four ters hang them on hooks, cut them in slices, throw them into a handbarrow, while one wheels off the flesh to be salted, another conveys the hide, bones, , and tallow to their appropriate places. In the salting shed is a large tank l with strong pickle. The slices are deposited in this for a short time, in r to wash them from all blood. They are then hooked out and packed under the shed in alternate layers of meat and salt. The slices take sufficient salt bout a week. They are then removed to another part of the shed, turned, piled again. This moving and piling is repeated several times. The meat n hung on poles in the sun for a few days, when it is again piled for the time, and looks in this, its last stage of preparation, in the separate pieces, much like codfish or sole leather; and, in the aggregate pile, very much a stack of cornhusks that has stood the storms of a New England winter.

And now, perhaps, the reader is ready to inquire whether, in its finished con-, it is a savory article of food. In reply, he may be reminded, in general , that *taste* is almost altogether a matter of education. At first, but very ns relish *tomatoes;* and yet there is scarcely any one who does not learn em them as one of the most delicious of all vegetables. Codfish, to an ilized palate, is at first about as agreeable as would be fine splints of ne board steeped in fermented and half putrid brine. Yet the civilized Yankees codfish a dish worthy to be set before a king. Tobacco stands among very first articles on the long and varied list of human luxuries. But who es not remember the retching that followed the first chew, or the first cigar? the same principle we should not be surprised to learn that jerked beef is y esteemed where it has been longest and most generally used. The people ıufacture it, however, will not eat it at all. It is mostly exported to and Brazil, and is appropriated to the use of the negroes who cultivate the and coffee plantations.

le are in best condition in March, which is the first month of autumn in nisphere. The principal killing season is from November to March. But the saladeros are continued in moderate operation all the year round. ablishments for the manufacture of jerked beef were first founded in o, and were among the first fruits of the immigration that flowed into the ry immediately upon the achievement of its independence. During the few years of their existence, it was rarely the case that as many as a hunea animals were slaughtered at one establishment in a single day. Now, there probably, nearly a hundred such establishments, at each of which are ered from two to four hundred head per day.

cost of a saladero capable of slaughtering four hundred head per day l be scarcely less than thirty thousand dollars. Take four men, skilled in n labors, and in fifteen minutes by the watch they will convert a living animal, ndi in the pen, into jerked beef, salted in the common pile. The writer has the process, watch in hand, and is satisfied that four such workmen

will average an animal to every fifteen minutes during the working hours of day.

HIDES.

Dried hides are from cattle that are killed for domestic consumption. The drying of them is rather a tedious operation, and one that requires a good deal of care. Those intended for German and English markets are stretched lengthwise only, by which the hide acquires a much greater thickness than it would if stretched both ways. As many as twenty-four or twenty-six stakes are for fastening the extremities of the hide to the ground. The dry hides desi[gned] for Spain, and other markets requiring thin leather, are staked so as to stretch them both laterally and longitudinally as much as possible. Hides shipped to Liverpool and Antwerp are generally twenty per cent. heavier than those intended for other ports; and those which are sent to the Spanish markets are said to be ten per cent. better in quality. Salt hides are first steeped in brine, then washed, and after the washing are packed away in alternate layers of hide and salt. Thus prepared they will keep well for at least one year after being taken from the salt. As to the quality of the pampa hides, it may safely be affirmed that better are not known to the commerce of the world. They may owe some of t[heir] superior qualities to the climate, some to the pasture, but the principal reason for their superiority is, that the breed of cattle have never been improved. [The] finer the animal, the thinner and less valuable the general qualities of the hide. This is mainly the reason why the most enterprising estancieros of the south have made no attempt to improve the native breed of cattle. What would be gained in flesh and tallow they think would be lost in hide and labor; and probably they are not wrong in this opinion.

TALLOW, ETC.

Every part of an animal is made available—horns, hoofs, hair, bones, and tallow, as well as the flesh and hide. The tallow is one of the most important items belonging to the general traffic. As soon as the flesh is sliced fr[om the] carcass, the bones and fat are deposited in vats, in alternate layers, for the p[ur]pose of being *steamed*. The bones are so arranged as to leave apertures thro[ugh] which the steam may quickly penetrate. The door of the vat is then closed, and the steam turned on. In twelve hours or more, according to the size of vat, the liquid is drawn off by means of a brass tap. The condensed st[eam, in] the form of a greasy liquid, is discharged first, and afterwards the liquid tallow, which is received in tubs, and thence conveyed to a large cast-iron boiler, in which it is purified. From the purifying boiler the tallow is conveyed through a shoot into a large iron tank, where it is allowed to cool down. After this it is drawn off into casks, and is then ready for shipment. Steaming for the purpose of extracting tallow was commenced about thirty-five years ago, and the process has undergone great improvement. The general arrangements necessary for steaming are quite expensive. A saladero, costing thirty thousand dollars, would re[quire a] steaming apparatus th[at] would co[st] at least, one-half that sum.

[illegible] [DELIVE]RY OF CATTLE.

[illegible] risk of delivery is with the purchaser, [illegible] the farm. There is a class of pro[illegible] like the same class in this country, how[illegible] [si]mply hired by the purchasers to convey [illegible]

[illegible] five assistants will convey to market [illegible] hundred head. The price per head for this service ranges

;y-five to seventy-five cents, according to the distance. When taken accustomed pasture grounds, cattle are somewhat restive and disposed When any special causes of disturbance occur many are lost—in a ces whole droves have broken away from their drivers and dispersed ns beyond chance of recovery. While *en route* for market, the custom for the night on some spot where the feeding is good. The drovers ride round the herd by turns. On stormy nights it is particularly keep the herd together, and whenever a general *stampede* occurs it is such times. Cattle in good condition will stand driving twenty-five day without injury. If pushed beyond this, the effect is very percepti- it is called "*tired beef.*" Cattle once delivered, either at the city mar- e saladeros, receive no further attention; and when the supply is large re allowed to remain in the pens for a week without a blade of grass or water. If they do not starve long enough to produce shrinkage of proprietors do not care for the sufferings of the poor beasts.

LOS BARRAQUEROS.

ing live stock, the produce of the country is offered for sale in a public narket-place. Sometimes the farmers themselves act as their own sales- the general usage is to employ a broker. The broker is styled a *bar-* ind his warehouse a *barraca.* When a mercantile house wishes to ob- , wool, or other produce of the country, a barraquero is employed to sales in the plaza and make the purchase. The articles are then to his barraca. If it be wool, it is packed (or baled, rather) with a press. Hides are simply stored in piles; and at the proper time the o attends to the shipment of the cargo. The merchant has only to ie money and keep the accounts, and the broker, for the entire cost and his agency, charges only one per cent. on the sum total of the export- will readily be perceived from these facts that the barraca business the most important branches of the general trade of the country. It equally shared by natives and foreigners. Some very sharp men are herein. They can tell all about a hide when it is yet warm and whole ack of the steer; or what the quality of a fleece is, and how many contains before the shears have touched it. While passing through the erving without being observed, the writer has often been reminded of .cy of the Jerseyman's eye and judgment, by which he correctly esti- v many square feet of ship timber or how many cords of wood there anding tree.

AMOUNT OF TRADE FURNISHED BY HORNED CATTLE.

tent and importance of this will appear from a single statement. During he produce of five hundred and sixty-two thousand head of cattle was ; the port of Montevideo alone. That city is the capital and chief port ublic of Uruguay. And something of the great wealth of that state, cattle, may be inferred from such an annual shipment, especially when lered that the revolutionary has become its chronic and prevailing con- 'he total number of hides exported from the river Plate and the Rio r one year was one million five hundred and eighty thousand; another million six hundred and fifty thousand. The amounts included in this are nearly all the product of the great pampa lands lying on the east- estern shores of the river Plate and its tributaries.

TRANSPORTATION.

allusion was made to this subject in the article on "Sheep farming in s," and as it is a matter which affects still more vitally the interests

of cattle farming, some facts, additional and more definite, with regard probably not be deemed out of place in the present essay. The greate the territory is a pampa which lies between the western banks of the P rana, and Paraguay rivers and the spurs of the Andes mountains. To graphy, either special or general, no allusion need be made, except so fa be proper for the illustration of the point in hand. Through this gene (and occasionally slightly undulating) country there are two great hi One of these connects the state of Buenos Ayres with the states of Sa and Mendoza, and from the last named with Chile, *via* the passes of the leras of the Andes. The other connects Buenos Ayres with Cordoba, S Tucuman, Salta, Jujuy, and thence with Chiquisaca, Cochabamba, and in Bolivia. By the first, from Buenos Ayres *via* Mendoza to Santiago the distance is four hundred and twenty-five Spanish leagues—a leag nearly equal to four English miles. By the second, from Buenos Ayre quiaca, (the connecting point between the Argentine confederation and livian republic,) the distance is five hundred and twenty-eight leagues. recently the only means of transit between the river and the interior two roads was by bullock carts, manufactured principally in the province man. The structure and general appearance of this vehicle carries t back to a very remote antiquity and a very primitive civilization. It of timber almost as hard and heavy as iron, and has, perhaps, not one that metal in its entire framework. There are neither iron boxes for th nor iron tires for the wheels, nor iron bolts for the tongue, nor iron na body. All is of the close-grained, hard, heavy wood which flanks the that form the headwaters of La Plata. The wheels are very large in ference, for the purpose of fording streams. The hub, rim, and spokes and clumsy, and the wheel, when complete, looks as though it might ha formed to turn a grist-mill or propel a steamboat. The frame of the of reeds, and the cover itself of straw or stout painted canvas. Six y oxen are attached to a cart, and six more accompany it as a relay. T draw by the horns. From the top of the cart cover several steel-point are suspended, some short, to quicken the memories of the oxen near and others long, to reach for the same purpose the remote advance. The is made in caravan, each consisting of fourteen carts and thirty drivers. to say, the axles are never lubricated, either with tar, grease, or any othe ration; and speaking within the bounds of moderation, it may be said creaking can be heard in the still air of the pampas for a distance of at l miles. A cart will convey a load weighing from thirty-five hundred thousand pounds.

The period for setting out from the upper provinces is in April or Ma the lowlands are dry and the streams shallow. The families of the frequently accompany the caravan, taking their dogs, cats, parrots, go other household pets; and the proprietors often do the same, taking th ies in separate vehicles, and bringing with the carriages a troop of hors o enjoy the variety of riding (as they express it, "*en coche y á cab* oaches and on horseback. The caravan proper and its numerous at orm quite a community; and for any one not in a hurry (and thes ever are) the journey affords many very agreeable sources of entert There is no lack of good things to eat. A fat sheep or a fine young he be bought for a song. Bags of hard biscuit are stored away among bu ides and bales of wool. *Máte* (Paraguayan tea) is provided in abunda very old and a very hard-headed trader, occasionally something ...r. The Sabbath is not recognized; but rest is indulged whe ... needful for man or beast. When the moon is at her full the ...es through the night as well as the day.. And, as the natives are ...usic and have a passion for dancing, the guitar and the dance are

or the entertainment of the company through most of the pleasant evenings the long journey. This is the bright side. These are the sweet ingredients e tasted in that primitive cup of trade.

t there are also many difficulties which breed their moments of vexation oi rness. Unexpected rains deluge the lowlands and swell the crawling to rushing torrents. At such times the tracts of swamp lands are so e that they cannot be passed in a day, and the wearied bullocks are :ea to stand all night up to their bellies in water. The women, children, dogs, cats, parrots, and monkeys must be stowed away in the carts, each ich is filled like Noah's ark, but can hardly be supposed to have that vessel's good order and harmony within. The streams have no bridges, swollen to the size of rivers, either the carts must be unloaded, and their ; and dead cargoes ferried over on rafts of raw hide, or the caravan must for days on their wet banks till the turbid streams subside. At best the s must be unloaded and loaded three times—twice in Santiago, and once in nan. The journey is necessarily tedious when shorn of its most disagree- causes of delay, the round trip from Salta to Buenos Ayres (fifteen or six hundred miles) requiring one whole year. The expenses of this mode of it are also very great. The cost of transportation and the duties to differ- ovinces through which the caravan must pass amount to not less than one red silver dollars per ton; and as the carts are laden chiefly with hides, hair—articles of large bulk in proportion to their value—the carriage must add forty or fifty per cent. to the original cost.

ne introduction, of late years, of a few small steamers on the Parana river somewhat lessened these difficulties. But the points of embarkation on that are so distant from all the western and northwestern provinces of the a country, that the ancient bullock train must, to connect with the wooden iboat, still wind its tedious way through hundreds of weary miles. It will dily perceived what heavy reduction must be made from the value of in- r produce when it finds its outlet by such a mode of transit. And, on the hand, the prices paid for manufactured goods, and all articles of taste and ury in those interior portions of the southern continent, must be so enormous only the most wealthy can avail themselves of them. The gentle *mestiza* n Juan or Santiago del Estero must pay a round sum for the silk hand- iief which she twines about her dark tresses and for the light shawl which draws loosely about her delicate shoulders, for festivities of a wedding or emonies of a feast day.

iiroads, with their cheap transportation, are things which belong to thickly ilated territories and an advanced civilization. Not till men are thus multi- l can the iron steam-horse take the place of the sturdy bullock and the nt camel. Whether the far-stretching and beautiful plains of the south ere long, be so stocked with enterprising men as to reap the advantages of ern progress, may well be made a question.

Great Britain has rich and vast fields for colonization. The Orient invites her its, and, with them, the merchants of other nations. Australia is rich in metals, and offers every inducement to the pursuits of agriculture.

> "This fair land our fathers trod—
> This land we fondly call our own"—

s forth her mighty arms of civil freedom and political equality, inviting ecognized and down-trodden of other lands to her blessed shores, and to icipation in the wealth, happiness, and honor with which she endows her ve-born sons and daughters. With such competitors centuries may yet come vanish, and the great pampas, with their verdure and flowers, remain the of pastoral simplicity, silence, and desolation.

COUNTRY LIFE.

Pastoral life has ever been much the same. The South American *est*
who is rich in broad tracts of land and vast herds of cattle, has many f
of character in common with pastoral chiefs and princes in the old coun
the east, and many of their social customs bear a strict resemblance. S
wise, the ordinary quarter or half breed herdsman of the pampas has n
common with the herdsmen who pitch their black tents and roam wit
flocks in the wilds of Arabia and Tartary. These two classes may be
constitute the whole of the native population of the pampas. With sh
has been already intimated, they have but little to do, their time being
entirely occupied with attention to horned cattle. The native proprieto
ing large estates seldom reside on them during the year more than the l
months of summer. They commit the entire management to a trusty
domo, and establish themselves in the cities and large towns, where t
dren can have the advantage of schools and society, and they themse
gossip with their neighbors, lounge at the cafés, frequent the opera and t
indulge their predilection for gaming, and, on high and solemn days
church to ogle the ladies, criticize the music, and stare at the performanc
rich proprietor is a gentleman of polished manners, and is never seen
street, at church, theatre, or elsewhere with any marks of carelessness
his personal appearance, or anything appertaining to his costume unw
his character and social position. He keeps a handsome carriage and
horses, round, sleek, and grave in their attitudes and motions as the Pop
In this the señora, with two of his grown daughters, or a trio of the
children, rides out on pleasant days after the five o'clock dinner. His
richly furnished, and stocked with servants in sufficient numbers to di
work into small departments and make it easy. The table is supplie
plenteous variety of rich viands. The cooks are trained to remem
national taste for garlic. The wines are of respectable age and excellen
and, what is much to the praise of the master and his household, are al
bibed in strict moderation. If there be extravagance anywhere, it is in t
of the family. Here the old Spaniard's love of display marks his A
descendant, and finds its utmost gratification. Even children that are
pendent on the care of their nurses are tricked out in laces, velvets,
broidery of silver and gold. The estate which supports this style ca
long inheritance, or a short confiscation, which was one of the results
period of bloody civil strife. It cost the proprietor nothing. Its man
occasions him little, if any, annoyance or solicitude, and he spends its
just as easily as they flow into his coffers. Such, in brief, is the rich
American cattle farmer or estanciero. If it be the true philosophy of li
and drink and die to-morrow, then is he a great philosopher and a hap

The second class deserving notice in any view of country life in the
consists of small proprietors of land and herds, small renters of l
owners of a few cattle, and the laborers who assist in the general work of t
It will be observed that what seems to be three classes are here specifie
The distinction, however, relates more to small degrees of differen
wealth than to any difference in the character and appearance of the
themselves. In their modes of thinking and ways of life, the small
proprietor, the small land renter, and the common day laborer, are subs
the same. They are alike distinguished in that country by the term "g
This is the term applied to them by the large proprietors and the weal
educated classes of the cities and towns. The term itself is an archi
one, and is used in the Spanish language to denote unlevel superficies.
application to *persons*, therefore, it may be understood to signify rou

lished mental character, and irregular, wandering, semi-savage habits and ı. The house in which the gaucho lives, if he can be said to live in a e at all, is called a *rancho*, a term familiar to American ears since the war th xico and the settlement of California. The gaucho's rancho is the same i as the Englishman's hut, or the Irishman's shanty. Its four corner posts e simple stakes driven into the ground. Its rafters and general framework e stalks of the aloe or the cane. Its sides and ends are plastered with mud, floor is the common earth, and its roof is thatched with paja, a species of ed that is found in the low grounds and on the edges of ponds and streams roughout the pampas. It is not usually divided into separate compartments. ıe furniture is almost as rude as that of an Indian's wigwam. In one end e stakes driven into the ground, on which a cow-hide is stretched, forming e bed of the family. A rough wooden stool, or the skeleton of a horse's ad, forms the only chair. An iron pot and a few tin pans and drinking vessels mplete the sum total of the household goods and chattels. Of course, there no very great amount of work to be done under the roof of such a primitive tablishment. There is nothing to eat but beef and pumpkin. The cooking therefore, merely a trifle. There is not much to wash and iron, because lren in that mild climate are not much addicted to clothing, and the costume adults, except when tricked out for a visit or a holiday, is reduced to the ıest style and the smallest quantity. The pampas señora's gala dress con- of white camisa, white stockings, plain kid shoes or black lasting gaiters, m d silk handkerchief or bright shawl for the head, and a gown of bright- silk or cotton. In describing the costume of the gaucho it will be to include the trappings of his horse, which, like the Arab, he makes s constant companion, but which he never regards with the Arab's gratitude ıd affectionate consideration. The saddle consists of a wooden frame, over h are strapped woollen blankets of various colors. Thus composed, it forms eeable seat for the long journey of the day, and a comfortable bed when alt is ordered for the night. The stirrup straps are made long, and the rup itself so small as to admit only the great toe. The bridle is of finely d raw-hide, and is frequently richly ornamented with silver. An unorna- ed bridle may be regarded as a mark of extreme poverty, and a ragged as proof of uncommon laziness and degradation. And in this connexion it be proper to remark that the pampa horseman never curbs the neck of his , but rides with a long rein. This partly accounts for the fact that the horse is remarkably sure-footed, and makes a long journey with but little arance of fatigue—galloping with ease to himself fifty miles in five con- ve hours.

ıı the gaucho be something of a "paquete" (or dandy) in his tastes, his yle of dress is both picturesque and pleasing. His full costume in such a consists of red cloth cap with tassels, close-fitting jacket of cloth, woollen l or merino, plaited on the shoulders with large flowing sleeves, resembling ther the tightly drawn bodice of a fashionable lady. What is called in ush a "chiripa," usually made of some gaily striped woollen, is wound d the thighs, and fastened over the hips with a girdle, called a "teridor." e, with white cotton drawers, usually fringed at the ankle to at least the of twelve inches, and "botas de potro"—colt's-hide boots—constitute gaucho's *tout ensemble*. The chiripa is usually selected with some care, t country dandy's highest taste is expended upon the teridor or girdle his waist. This is almost invariably adorned with Spanish silver dollars gold doubloons, worn as buttons where there are holes for them, and simply ornaments where there are none. Frequently both buttons and ornaments e of pure gold. The writer remembers one of these country *paquetes*, who into town on some business with one of the American merchants, and had dor sixteen gold doubloons, which, converted into United States *hard*

currency, would amount to two hundred and fifty-six dollars. So the reader will perceive that semi barbarous as well as civilized life has its expensive tastes to be gratified. In this particular case the gaucho's teridor would purchase complete the toilette of the American belle, provided she would forego Brussels laces, Italian crapes, India cashmeres, and would set a dandy on his feet in Chesnut street or Broadway, in full attire, with some loose change in his pocket for the opera or the play.

The gaucho, whether dandified or plain, is a gentleman of leisure. If he be only a herdsman he has but little to engage his thoughts or tax his energies. If he be the owner of a herd, so much the better for that love of idleness which is one of his ruling passions. His establishment does not cost him a moment's care. A boy, mounted on an old horse, with a piece of broiled beef in his pocket and a jug of water within convenient reach, rides round the cattle during the day to keep them within the owner's unfenced domain, to see that some honest neighbor does not mistake them for his own property, and to drive them up to the *rodes* at sundown. To the proprietor, therefore, the boys and their herds furnish merely incidental occupation. The climate and soil are favorable to the cultivation of all kinds of vegetables, but he has no garden. The most delicious fruits might be produced, but he has neither trees nor vines. His herd would afford him milk and butter, but he does not drink a gill of milk in a round year on his own farm, nor eat an ounce of butter in a lifetime. The *zapallo*, or pumpkin, which he takes with his meat, grows like a gourd, wildly and without attention; but frequently he is even too indolent to put himself to the trouble of digging a hole and dropping the seed in, and rather than do so buys his pumpkin of some foreign immigrant or more industrious brother native. He will pay some little attention to his favorite horse, and that is about the sum of his industry and the extent of his cares in this world. As for the next he knows precious little about it, and cares still less. His serious life-long occupation consists of racing horses and gambling with his neighbors. And as he can neither read nor write, and is not obliged to labor, his passion for these pastimes is no matter of surprise. The larger portion of the proceeds of his cattle is squandered in this wretched way. As in the case of his brethren of the black-leg profession, in more civilized communities, his good fortune to-day beggars him to-morrow. The more rapid his losses, the more desperate he becomes. At such moments he will not only stake his last dollar, but his horse and trappings, the clothes on his back, and (more than this) he will even put to the hazard the concubine in his rancho, or stake his own body and soul, pledging himself to remain in confinement till some friend can ransom him by paying the required sum. Such constant and desperate playing might be expected to lead to violent quarrels, and even to bloodshed and death. Quarrels do frequently attend their play, but violence and death not often. Every gaucho carries a knife in his girdle, and the enraged player will draw and strike in the first moments of his passion, but parties interfere, he quickly cools down and is easily pacified.

An extended and detailed sketch of the native pastoral life of the pampas would be out of place in the present article. If it were otherwise, and were such a sketch faithfully drawn, it would seriously shock the feelings of those who know pastoral life only from romancing books of travel or poetic descriptions. Poets, of all living men—aye, even more than successful politicians or popular preachers—need a very wide margin. The writer knows not that he has ever been able to conceive so clear an idea of the exquisite taste and fertile ingenuity, the illimitable skill and exhaustless invention of the human soul, as when reading descriptions of pastoral life in poetic numbers or romantic prose. It is no matter of wonder that the faculties which first made pastoral life a thing of beauty afterwards invented the telescope, the quadrant, the inting press, the steamboat, the rail car, and the magnetic wire. It may be a

isfortune to be destitute of that wonderful faculty which can clothe with beauty e meanest clod. But it is as surely an inestimable blessing to be endowed ith that plain common sense which paints the world and men, if it may be id to paint anything, just as they live and move. And the writer would spectfully inquire of any brother of the fraternities of romantic travellers and astoral poets, whether fleas do not abound in pastoral countries, and whether astoral maidens were found in Swiss hats, buff skirts, kid shoes, streaming s, crook in hand, seated on a flowery bank, while gentle streams went ring at their feet; or, half naked and besmeared with filth, they sat on shady side of a leaking, smoky, and dirty cabin, busily employed at plucking vermin out of each other's long, greasy, tangled hair?

The religion of the pampas is, in the native mind, a thing of vague, supersti- s t tion. In the remote districts the population is so sparse and so widely sa ea t t it would be difficult to provide church accommodation in localities vould insure attendance. The souls that live thus secluded from the great ways of southern life are but little cared for, and are consequently acquainted y with the most simple rudiments of the national faith and worship. The ss as a symbol, the evening hymn to the Virgin, the brief prayer for protec- n and blessing to the patron saint, form the principal marks of distinction be- ween the religious customs of these Christians, these mixed descendants of the nish conquerors, and those of their Indian neighbors of the Grand Chaco and Patagonian wilds. Their moral habits are simply what might be expected r their rude condition and non-intercourse with classes whose education pro- luces a better example. Far out in the plains marriage is the exception, and polygamy prevails without disgrace or even censure from the lips of either sex. It is, in brief, a state of society in which are to be found many of the vices of civilization, and but few of its virtues.

THE RIVER AND THE CITY.

La Plata, with its great tributaries, forms the grand outlet for the whole of that nse portion of the southern continent which lies south of the Amazon and of the Andes. Of this rich and vast country, the principal port is the city Bu nos Ayres. Before the independence it was the only port, and in conse- e of that fact it enjoyed almost from its foundation superior advantages. The city stands on the west bank, and extends to the edge of the river. Its site s about in the middle of a long semi-circular sweep or bend, which the river makes between Point San Fernando and Point Indio, a distance, probably, of fifty miles. The highest point of elevation in the site above the river is, per- haps, not more than fifty feet. The city covers nearly as much ground as Philadelphia, and lies much in the same form—the *reachuelo*, or little river flowing around the southwestern suburb, corresponds to the Schuylkill and La Plata to the Delaware, except that the former has, at the point where it leaves the city, a width of thirty miles. Approaching from the sea the city presents a fine appearance. The harbor is very capacious. The inner roads, where vessels of not more than two hundred and fifty tons are anchored, are about a mile and a quarter from the beach, and the outer roads, where vessels of heavier tonnage anchor, are distant from the beach not less than seven miles. To a distance of six or eight hundred yards from its margin the river is so shoal that a man may e it. This, it may seem to us, should have taught the founders that a *mole* a necessity of the first importance to the comfort, reputation, and prosperity the port. But they never did so understand, and, until within the last ten , all cargoes were landed at first in small vessels called *lighters*, and where se ched bottom their freight was transferred to horse carts having crate n wheels. Some eight years ago a mole was built extending far to the lighters. At the same time the lighters ought to have been

supplanted by steam tugs, but they were not; and, it is presumed, continue to be used to this day. They afford but a sorry convenience for discharging a ship's cargo. Considering the days of high wind, when it is impossible for the lighters to carry sail, and the incessant propensity of the Spaniard to procrastinate, it may at once be inferred that the discharge of a ship is a tedious and vexatious undertaking in the port of Buenos Ayres. The fact is, that some of the captains arriving at that port for the first time wear out their patience, and then nearly swear away their lungs before they get ready to bend sail and stand southward for the ocean. Probably the principal reason in the minds of the conquerors for founding a city on a beach so broad and shallow was to place it beyond the reach of an enemy's guns. In this their plan was a triumph in their day. But in this day of swamp angels, Barnard, Gillmore, or Farragut would anchor in the outer roads, and, with their improved artillery, quickly batter the city to the ground. Buenos Ayres, in several respects, can hardly be regarded as a Spanish-American city—certainly not in the same sense as Chuquesaca, La Paz, and Cochabamba. Being the only port of entry on the river, under the dominion of old Spain, it enjoyed peculiar privileges, and cultivated intercourse with the ports of other countries to an extent which greatly modified its purely Spanish characteristics. And still, as the chief port for the immense productions of the sheep and cattle farms of the pampas, it excels in wealth and all the means of civilization, and is great enough to be a competitor of Rio de Janeiro, the commercial metropolis of the southern continent.

SYSTEM OF FARM ACCOUNTS.

BY JOHN H. BOURNE, MARSHFIELD, MASSACHUSETTS.

THE following essay is presented, not as a system of book-keeping adapted to mercantile business, where large sales are daily made, but for the use of the thousands of farmers scattered all over our broad land, from Maine to California, owning farms varying in size from ten to a thousand acres. Nor is it brought forward as the only or the best one that can be employed, but as one that has proved practicable, and that can be carried out by any one who can write and perform simple operations in arithmetic.

The importance of keeping an account of the income and expenses of the farm has not been fully estimated by the majority of farmers. If they have dealings with their neighbors, they keep some record of it; but they cannot tell how the account stands with their farm. They do not know whether there is more profit in raising hay or corn, potatoes or cabbages, cattle or hogs, or whether any thing pays. It is not always advisable to take note of the expenses of every field, yet it is often well to see what it costs to raise a crop of grain, roots, &c., in order to judge the comparative value of each.

Many farmers are deterred from keeping a record of their receipts and expenditures by the belief that it is too complicated for them; others, that it will take too much time; a few, because of their unwillingness to attend to any intellectual labor; and others, still, because they do not feel its importance. It is important and practicable for all, and no man should consider that he has reached the rank of No. 1 farmers unless he keeps accurate accounts with his farm; and one of the best means to reach that rank is to commence and continue well-arranged, simple, and accurate farm accounts. We admit that it is more difficult to arrive at the *exact* cost of a certain crop or animal, than for the merchant to

at the cost of his goods. For instance, in raising a calf it would take a great
al of time to keep an account of every quart of milk, every pound of hay,
ery ear of corn, pint of meal, or bushel of roots consumed, together with every
of time employed in feeding, watering, and otherwise tending it, until it
d maturity. But an approximation can be reached near enough for all
l purposes.

mes we see accounts, even in agricultural reports, in which everything
ner raises is set down at the market value. For instance, credit is given
number of tons of hay, the number of bushels of corn and potatoes, and
thing that is raised, without a corresponding debit of what is used in keep-
stock through the year—making it appear as if the net income was very
rge, when, in reality, nearly all is used upon the place. A farmer may, per-
, plough large fields that have been previously manured, and, without ap-
any fertilizer, obtain a good crop, which, when sold, brings in a large sum
y. He may decide that his profits are large; but a system of book-
that estimates the value of the land of each field, each year, would
im to appraise the fields from which his large crops were taken as of less
than before. This would show him that the profits were not really as
as he at first supposed. Another might spend a good deal of time and
y in making improvements, which, for the present, bring in no profit, and
ht seem that nothing was made by farming; yet an account of what his
vements cost, and of all that the land (on which the improvements were
e) produced for several years would change his opinion. Thus, by carrying
a system of book-keeping, which not only applies to the farm as a whole,
lso to each operation in detail, a very large fund of practical knowledge
be obtained in a few years. If each farmer in our nation would thus esti-
the expenses of his business our practical knowledge of the value of agri-
l products would be much increased, and the amount of productions in the
ion be vastly enlarged.

Some charge no interest upon their cattle, tools, land, and buildings; others
ll a large quantity of wood each year, which is all considered as profit, without
l to the diminished value of the lot; these all deceive themselves, thinking
y have made a large profit by farming, when the profit, in reality, comes from
other source.

The plan which I propose to present is one which I have, in part, followed
ome years, and has answered every purpose. It is so simple that a person
se education is very limited can adopt it. The productions raised, and the
ces of both productions and labor, vary much in different localities; but
principles will apply in all circumstances, and a little practice will make the
ication of these principles easy. For convenience, it will be better to use
one book; it may be of any size and shape, but the most convenient shape
have found to be very nearly in the form of this which you are now reading—
tu port—and containing about two hundred pages, made of ruled
r, ving two ruled lines on the right hand, up and down the page, for
rs and cents, and one on the left hand for the date of the transaction. Let
book be paged, writing the numbers plainly, and place an index at the com-
ement. Following, should be an inventory of the value of the farm, the
k and farming implements, leaving a few blank leaves for inventories in
years. Next, may follow what may be called a memorandum or journal,
which should be noted all transactions important enough to be remem-
This will require no debit or credit, but is simply a history, im-
ant for reference, and will serve to prove the time and nature of any trans-
At one-third the distance from the beginning should commence the cash
or farm account, in which every sale is credited to the farm, and every
is debited. Commencing with the last quarter of the book may be kept
nt with different fields, hired men, and every person with whom an
is kept.

As the season begins in April, I would commence the year with that month—as less produce is on hand, and it is easier to take an inventory, (or "account of stock," as merchants call it,) which should always be done. It will require some judgment to rightly estimate how much more, or less, each animal is worth than one year before; whether your buildings and fences are in as good repair; whether your land has improved or lessened in value; whether the new tools purchased are equal in value to the loss by use of the old; whether you have more hay, grain, or vegetables on hand than at the commencement of the previous year, all of which should be correctly ascertained, being appraised at the market value. If an inventory is not taken, however accurate the account of the receipts and expenditures may have been, the real income or loss of the farm will not be known; and the more accurately the estimate is made, the nearer correct will be the figures that show the gain or loss for the year.

The farm to which the following figures apply is one upon which a mixed system of husbandry is employed, and its poverty of soil and distance from a market may, in part, account for the small net income of the year. The following will assist in understanding the plan to be pursued. It would, perhaps, be better to name and appraise each animal and each wagon separately, as, in case of losses or sales, the loss or cash could be set against it more readily.

INVENTORY OF FARM STOCK, TOOLS, ETC., APRIL 1, 1865.

Farm of about one hundred acres, upland and meadow, in a poor state of cultivation, with a house, two small barns, and other outbuildings, which would probably bring at auction	$2,550 00
One horse	100 00
Six oxen	620 00
Three cows	185 00
One heifer	35 00
Three turkeys	6 50
Ninety hens, at 75 cents each	67 50
Two swine	80 00
One express and one riding wagon	100 00
Ox wagon and ox cart	50 00
Harnesses	25 00
Truck harness	5 00
Yokes	5 00
Ploughs and cultivator	20 00
Ox sled and chains	8 00
Spades, shovels, and forks	10 00
Corn sheller and harrow	10 00
Hoes, rakes, and other tools	30 00
Horse rake	8 00
Hand threshing machine	15 00
Grindstone	5 00
Baskets	4 00
Corn	15 00
Rye	5 00
Potatoes	30 00
Wheat	5 00
Three tons English hay	75 00
Two tons salt hay	20 00
Family stores	155 00
Amount of inventory on which interest is to be reckoned for one year	**4,244 00**

JOURNAL.

To go through the year would occupy too much space; and as it is my pur- simply to give a specimen of what should be done, I will give a memo- m of only one week every two months. It is not necessary to note every n the journal, only the more important, and such transactions as one wishes r ·mber.

April 1, 1865.—Have this day taken an inventory of farm and what is on ll of which are worth at the market value about $4,244.

Have engaged two men to work for the season; one, Charles Gross, at $25 r month, and the other, William Aiken, at $23.

April 3—Ploughed for grain and grass seed.

April 4.—Ploughed for onions, and purchased onion, grass, and garden seeds, meal for feeding, and tools for summer use.

April 5.—Gave the onion ground thorough preparation for the seed, harrow- in fine manure, and working out all lumps and stones, making it mellow d level.

April 6.—Sowed onion seed, and finished sowing grass seed.

[Omitting till first week in June.]

June 1.—Planted cabbages, putting hen manure mixed with loam in the

June 2.—Sold one yoke of oxen for $197, which cost $105 last fall. They e done considerable work, and have had good keeping of hay and meal. e only way I know in which anything can be made in keeping cattle is to d liberally.

June 3.—Hoed potatoes and corn, and planted squashes and melons.

June 5.—Bought one yoke of oxen for $135, which are in thin flesh, but ll probably gain during the coming summer.

6.—Hired another man, Patrick Murphy, for the remainder of the to be paid $24 per month. I believe in hiring an abundant supply of and that more is lost by not having help enough than by having too much.

[Omitting till August.]

August 1.—Men employed in hoeing cabbages and turnips.

August 2.—Went to market, carrying potatoes, cabbages, eggs, &c. Pur- ased one fine Cotswold buck lamb for $—.

A st 3.—Employed the men in filling low, swamp land for mowing. Last e best grass on the farm was upon land so reclaimed.

A ust 4.—Mowed salt grass.

A st 5.—At work filling swamp land.

[Omitting till first week in October.]

October 2.—Men at work digging muck. Went to market.

October 3.—Gathered onions; a small crop, owing to a very dry summer hased oxen and steers for $—.

October 4 and 5.—Digging potatoes; very good crop; better than was ex- ted.

October 7.—Drawing sea manure.

[Omitting till first week in December.]

December 1.—The time of the men being out, only one is to be employed ing the winter; the others are paid.

December 2—Spending time in making everything snug for winter. The and hog yards are now filled with muck, bedding is secured, and part of it oused, and the remainder stacked, so that it can be kept dry; and every- g is done to keep the stock warm and comfortable.

December 4.—Sold two fat hogs and eight pigs for $—.

[Omitting till first week in February.]

February 1, 1866.—Employed in laying plans for the coming year. In

looking back over the failures of the past year, find they have generally arisen from two causes: first, poverty of soil or a lack of manure; and second, not having men enough to perform all the work at the right time. In addition may be added one beyond the control of man, which was, long and severe drought.

February 5.—Man employed in getting wood for the year.

CASH BOOK.

In this book everything spent for the benefit of the farm is charged to it as debtor, and everything sold, being the product of the farm, is credited to it instead of using the owner's name.

Each debtor page is to be headed as the following— Each creditor page is to be headed as the following—

DR.

Date.	Farm.	Amount.
1865.		
Apr. 4	To 4 lbs. onion-seed, at $2 25	$9 00
	To 30 lbs. clover-seed, at 15 cents	4 50
	To 1 bag red top	4 00
	To ½ bush. Herd's grass	2 00
	To ½ bush. orchard grass	2 25
	To garden seeds	3 50
	To 500 lbs. oil-meal, at 2½ cents	12 50
	To 2 shovels, at $1 25	2 50
	To 2 hoes, at 85 cents	1 70
	[Omitting until 1st week in June.]	
June 5	To 1 yoke of oxen	135 00
	[Omitting until 1st week in Aug't]	
Aug. 2	To 1 buck lamb	10 00
Aug. 3	To William Aikon	8 00
Aug. 4	To taxes	86 55
	[Omitting until 1st week in Oct'r.]	
Oct. 3	To 1 yoke of oxen	160 00
	To 5 steers	225 00
Oct. 5	To Patrick Murphy	24 00
	[Omitting until 1st week in Dec'r.]	
Dec. 1	To Patrick Murphy, (in full)	43 25
	To Charles Gross, (in full)	175 00
	[Omitting until 1st week in Feb'y]	
Feb. 1	To linseed meal	24 00
	Blacksmithing	7 50

CR.

Date.	Farm.	Amount.
1865.		
Apr. 7	By 2 pigs	$15 00
	[Omitting until 1st week in June.]	
June 2	By 1 yoke of oxen	197 00
June 7	By 1 calf	11 00
	By 15 bush. potatoes, at 60 cents	9 00
	[Omitting until 1st week in Aug't.]	
Aug. 2	By 8 bush. potatoes, at $1 50	12 00
	By cabbages	8 40
	By 12 dozen eggs, at 30 cents	3 60
	By 30 bunches onions, at 5 cents	1 50
	By 15 bunches turnips, at 5 cents	75
	By 20 dozen green corn, at 15 cts	3 00
Aug. 5	By 12 lbs. butter, at 40 cents	4 80
	[Omitting until 1st week in Oct'r.]	
Oct. 2	By 5 bbls. onions, at $2 25	11 25
	By cabbages	5 25
	By 15 dozen eggs, at 30 cents	4 50
	By melons	4 30
Oct. 6	By 15 bbls. onions, at $2 25	33 75
	By 4 bbls. apples, at $4	16 00
	By chickens	15 40
	[Omitting until 1st week in Dec'r.]	
Dec. 2	By 50 lbs. butter, at 45 cents	22 50
	By 940 lbs. pork, at 16 cents	150 40
	By 8 pigs, at $4	32 00
Dec. 4	By ½ beef, 156 lbs, at 13 cts	20 28
Dec. 5	By 92 lbs. hide, at 8½ cents	7 82
	[Omitting until 1st week in Feb'y]	
1866.		
Feb. 1	By 25 bush. potatoes, at 60 cents	15 00
	By 8 bush. turnips, at 60 cents	4 80
Feb. 5	By 15 dozen eggs, at 35 cents	5 25
Feb. 6	By 4 steers	250 00

The above (being only detached parts, comprising merely six weeks of the year) will serve as a specimen to assist in understanding the manner in which each sale and expense is recorded. The debit side, or expenses, should be on the left hand page, and the credit, or sales, on the opposite (right) hand page, and when *either* page is filled, *both* should be added up, and the amounts placed at the bottom, when new charges and credits should be commenced on the next two pages. In like manner go through the year, and then the amounts can be drawn off and used in the final settlement.

The inventory at the end of the year will be omitted in this essay to save room, but the amount must be used in the settlement.

To find the gain or loss for the year, take—

The inventory April 1, 1865	$4,244 00	The inventory April 1, 1866	$4,123 50
Interest on that amount for one year	254 64	Amount of sales for the year	2,545 84
Grocer's account for the year	175 85		
Butcher's account for the year	85 40		6,669 34
Expenses of farm for the year, being the amount of all the debit pages of cash book	1,681 29	Take expenses, value of farm, &c., April, 1865	6,441 18
	6,441 18	Net income	228 16

s amount is received for services of owner and family, besides that por-
f their board and clothing furnished by the farm. It allows for the addi-
or decreased value of the farm-buildings and fences.

last quarter of the book being devoted to separate fields, poultry, cattle, 's account, butcher's account, &c, a few items will be given to show the d in which they are kept:

CORN FIELD, (two acres sward land.)

Dr.

1.	To 12 cords of manure, at $5	$60 00
1 and 2.	To getting out and spreading	12 00
3 and 4.	To ploughing	13 00
8.	To harrowing	3 50
9.	To furrowing one way, 3½ feet apart	2 00
10.	To seed corn	1 00
10.	To planting	3 00
3.	To cultivating and hoeing	6 50
20.	To do. do.	6 50
1.	To do. do.	6 50
st 25.	To cutting and curing top stalks	8 00
3 and 4.	To harvesting	15 00
	To interest on land and taxes	6 50
		143 50

Cr.

8 bushels corn, at $1 10	$140 80
tons top stalks, at $10	30 00
tons butt stalks, at $8	32 00
Value received	202 80
f crop	143 50
Net income on two acres	59 30

CARROTS, (one-fourth of an acre.)

Dr.

12.	To 2 cords manure, at $5	$10 00
	To drawing manure	2 50
13.	To ploughing and preparing land	3 00
20.	To seed and sowing	1 50
20.	To hoeing and weeding	10 00
.0.	To harvesting	4 00
	To interest on land and taxes	2 50
		33 50

Cr.

150 pounds carrots, at ½ cent per pound, or $10 per ton	$42 25
ue of tops	2 25
Value received	44 50
f crop	33 50
Net income	11 00

ONIONS, (one-half acre.)

Dr.

April 4.	To 4 cords of manure, at $5	$20 00
	To drawing and spreading	3 00
5.	To ploughing	2 00
	To cultivating, harrowing, and raking	4 00
6.	To seed and sowing	12 00
June 6.	To hoeing	28 00
Oct. 3.	To harvesting and topping	12 00
Nov. 6.	To drawing to packet and freight	25 00
	To barrels	21 00
	To interest on land and taxes	5 00
		132 00

Cr.

By 95 barrels onions, at $2	$190 00
Cost of crop	132 00
Net income	58 00

BEEF ACCOUNT.

Dr.

To 4 steers, at $45	$180 00
3 tons salt hay, at $10	30 00
½ ton English hay	10 00
30 bushels meal, at $1 10, (2 quarts each per day)	33 00
	253 00

Cr.

By 4 steers	250 00
Loss besides the care of feeding	3 00

MEM.—Yet it is better to feed the hay upon the place, if as much can be obtained for it as it would bring if sold, even if little is received for the labor of feeding out. The manure thus made should be estimated as part of the credit.

COST OF RAISING "DAISY," A HEIFER TWO YEARS OLD, AND NEAR CALVING.

Dr.

To value when four weeks old as veal	$12 00
6 quarts of milk per day for three weeks	3 78
4 quarts of milk per day for next three weeks	2 52
2 quarts of milk per day for next three weeks	1 26
meal and grass to November 1	1 25
one pint of meal per day to May 1	4 00
hay to May 1	4 00
care the first year	8 00
pasture till November 1	3 00
hay and grain to April 1	15 00
care the second year	5 00
	59 81

—Not having calved, she is yet to be proved, although indications are ıe will be worth all she cost. When she has been proved, her value may ›red beneath her cost stated above.

GROCER'S ACCOUNT.		BUTCHER'S ACCOUNT.	
l. Sugar	$2 15	April 1. 6 lbs. steak, at 20c...	$1 20
Kerosene	1 40	6. 8 lbs. beef, at 14c....	1 12
Molasses...........	2 00	7. 15 lbs. fish, at 3c....	45
3. 2 lbs. tea	2 50		
5. Crackers...........	25		
5. Flour	12 50		

keep account to the end of the year.]

milar account of dry goods and of general household furnishing should be also, of all marketing sold.

ı said that farmers are more slack in their payments than most other busien. It is true they generally pay in time; but they are often short of and get trusted for what they buy, thus keeping always in debt. This not so to be, and a little system in keeping an account of the income and es will have a favorable influence in assisting them to keep out of debt. rder that every record may be accurate, it is necessary that it be attended ı night, while fresh in the mind. A small book in the pocket, or a slate ncil hanging in some convenient place, may assist in retaining the prinacts and figures until they can be transferred to their appropriate places

'EEDS OF AMERICAN AGRICULTURE.

BY THE LATE WM. DARLINGTON, M. D., WEST CHESTER, PENN.

re are sundry plants which are worthless and unsightly or offensive in tural grounds, and others which are especially injurious as intruders cultivated crops. Such plants are regarded by all neat farmers in our y as nuisances to be abated, and are known by the distinctive appellation ls. In preparing such a list as that here contemplated, I propose to very briefly, in a familiar style, the character of the nuisances referred , with a view to economizing space, detailed botanical descriptions are l. The curious in such matters can readily acquire the knowledge of letails by consulting local and general floras. It is designed simply to › the plants herein enumerated, merely in accordance with the *natural* ', as employed by some of the most approved modern authors, as De Can-Hooker, Torry, Gray, &c., giving the authentic scientific names of the and species, so that all concerned can speak of them understandingly elligibly, and annexing the common or popular names in the vernacular, the same are known or in use. With these aids and facilities, as o further researches, and accompanied with familiar remarks on their er, it is believed the weeds of our agriculture may become accurately , and be disposed of, as they ought to be, by every intelligent and enter-young farmer in the land.

SERIES I.—PHAENOGAMOUS OR FLOWERING PLANTS.—CLASS I.—EXOGENOUS PLANTS; *outside growers*. SUB-CLASS I.—ANGIOSPERMOUS EXOGENS; *outside growers, with seed vessels*.

DIVISION I.—DIPETALOUS EXOGENS; *the petal mostly distinct*.

1. *Ranunculus bulbosus*, (L.)—Buttercup, bulbous crowfoot, (p.)* This foreigner is extensively naturalized in grass plots, meadows, and low ground pastures along our streams, where it is regarded as a nuisance by the farmers. The fleshy bulb is highly acrid, and the plant when once introduced is difficult to subdue. The most effective remedy yet found is to get the plant closely depastured in early spring by stock, especially sheep.

Another perennial species, viz: *R. acris*, (L.,) or tall crowfoot, is naturalized in New England, and is as obnoxious as its congener.

2. *Delphinium consolida*, (L.)—Field Larkspur, (a.) This introduced plant has strayed from the garden in many places, and is an unwelcome intruder in grain fields and other cultivated grounds. This and a kindred species *(D. ajacis)* (L.) have become so common in gardens that some attention is requisite to prevent them from trespassing on the farms. Plants which have matured their seeds in the garden should never be carried to the barn yard, nor permitted to mingle with farm manures, otherwise the fields will be speedily infested with worthless and pernicious weeds.

A slight ploughing after the removal of the crops from the field will favor the germination of the seeds, which will be destroyed by the regular ploughing of the field.

3. *Papaver dubium*, (L.)—Field Poppy, (a.) This foreigner has found its way into some districts, and, if unattended to, may become a troublesome weed, as it and the "Corn Poppy," *P. rhoeas*, (L.) are in Europe. A similar remark is applicable to the Prickly Mexican Poppy, *Argemone mexicana*, (L.,) another kindred weed which has been introduced. This plant should be extirpated by hand-weeding before the ripening of the seed. In Italy the prickly poppy became so obnoxious as to be called "infernal figs."

4. *Camelina sativa*, (Crautz.)—Wild Flax, gold of pleasure, (a.) A naturalized foreigner, and, where neglected, becoming a great nuisance—formerly supposed by the simple and credulous to be a sort of transmuted or degenerate flax. It has been subdued by annual ploughing, so managed as to allow the seeds to vegetate, and thus destroy the young plants before the seeds on them are matured.

5. *Capsella bursa pastoris*, (Moench.)—Shepherd's Purse, (a.) A worthless little intruder from Europe, but the valuable grasses will generally choke such small weeds.

6. *Raphanus raphanistrum*, (L.)—Wild Radish, jointed charlock, (a.) A naturalized weed, becoming a nuisance in the northern States. It has already invaded New England and Pennsylvania, and is tending westward. The seeds are contained in a jointed pod, and are thus protected from the severity of frost and concealed from birds until liberated by the process of decay of the pod.

7. *Hypericum perforatum*, (L.)—St. John's Wort, (p.) A foreign weed formerly supposed to cause cutaneous ulcers in *white* cows and on horses with *white* feet and noses; but, the disease disappearing, that notion seems to have become obsolete.

8. *Agrostemma githago*, (L.)—Cockle, rose campion, (b.) A well-known foreign weed infesting wheat fields. The black-coated seeds, when abundan

NOTE.—The following letters are used for the sake of brevity: (p) denotes a perennial plant or root of more than two years' duration; (b) denotes a biennial plant of two years' duration; (a) denotes an annual plant living but one year; (s) denotes a shrub or small tree—a woody perennial.

d with wheat, are injurious to the appearance of the flour. The root
ıiant should be cut below the surface with a chisel fastened to a long
ınd wielded by children. If this is neglected in the early part of the
he fields should be scarified immediately after the removal of the crops,
the germination of the seed, and ultimate destruction by fall ploughing
frost. The seed obtained from the screening of cereals should not be
ıut upon the manure heap, but fed to fowls, and the refuse left by them
e burued the next day.

utilon avicennæ, (Gaertn.)—Indian Mallow, velvet leaf, (a.) This for-
ıitherto regarded as a worthless and troublesome intruder in Indian
ds, potato patches, and other cultivated lots, has been recently an-
(together with *Hibiscus moscheutos*, (L.,) a malvaceous perennial, na-
ıur maritime marshes,) as yielding a fibrous bark suitable for textile
, similar to the "Jute" of commerce, obtained from Asiatic species of
s, and employed in the manufacture of gunny bags. The economical
this material, which is termed "American Jute," must be ascertained
ience.

hus venenata, (D. C.)—Poison Sumach, poison elder, (s.) A noxious
quent in moist, low grounds, by which many persons are liable to be
isoned. A similar cutaneous affection is often produced by the climb-
ty of another species—the *Rhus toxicodendron*, (L.,) Poison Vine or

ifolium arvense, (L.)—Stone Clover, Welsh clover, rabbit-foot, (a.)
ign plant is only entitled to notice on account of its worthlessness and
e in poor old fields. Its presence is a pretty sure indication of a thin
ıeglected agriculture, and the obvious remedy is to improve both.

tentilla canadensis, (L.)—Cinquefoil, fivefinger, (p.) The varieties of
ather harmless, though worthless native weeds, and are merely indica-
neglected soil. There is also a coarse, erect, homely, annual species,
gica, (L.,) which is becoming a frequent weed in the middle States,
s to have migrated from the North.

ıbus villosus, (Ait.,) Blackberry Bramble, common brier, (p.) Every
's the common brier; the fruit in its season is a general favorite, and
rkably fine varieties have been produced under careful culture. The
of the plant, however, to spread and take possession of neglected fields,
to be regarded as something of a nuisance where it prevails. Another
red species, the *R. cuneifolius*, (Pursh,) or Sand Blackberry, has found
ıto Pennsylvania, apparently from New Jersey, and bids fair to estab-
in the land of Penn. Fence angles and waste places in which the
ve obtained a foothold should be cleaned of all weeds twice yearly, in
d autumn. This will not only exterminate the briers, but admit air and
he field borders, otherwise shaded.

ıbus canadensis, (L.,) Dewberry, running brier, (p.) Our American
is a fine fruit, and generally preferred to all the blackberries proper,
ıot the dewberry of England, which is the *rubus cæsius* of Linnæus.
scarcely a farmer's boy in Pennsylvania who is not well acquainted
plant, from having encountered its prickly, trailing stems with his naked
ıile heedlessly traversing the old fields where it abounds. On well-
farms, however, this and all other species of brier (not excepting our
pberries) are becoming rare.

sa carolina, (L.,) Swamp Rose, (p.) This is often an obnoxious plant
adows and low grounds, forming unsightly thickets with other weeds
ed. Another native species, *R. lucida*, (Ehrh.,) the Dwarf Wild Rose,
equent in neglected grounds. The foreign Sweet Brier, *Rosa Rubigi-*
) is naturalized in many localities and deemed a trespasser.

yos angulatos, (L.,) One-seeded Star Cucumber. This climbing vine,

with leaves resembling those of the cucumber, is a native weed, and a vile ance when admitted into gardens and cultivated lots.

17. *Daucus carota*, (L.,) Wild carrot, (b.) When this wild variety common garden carrot becomes thoroughly naturalized, as it is now on farms in the middle States, it is a troublesome weed, and requires persevi vigilance to get rid of it. It should be diligently eradicated before it rip seeds. In case of snow, with a smooth surface crust, the mature umbels off and are driven by the winds to a great distance, and thus annoy an ext district. Another umbelliferous nuisance is created by permitting the v garden parsnip, *Pastinaca sativa*, (L.,) to disseminate itself and multiply in adjoining fields, and along fence rows, giving to the farms a very slovenly pearance.

18. *Archemora rigida*, (D. C.,) Cowbane, wild parsnip, (p.) This native occurs frequently in swampy meadows, and is reputed to be an active po when eaten by horned cattle, which, however, probably seldom happens, u the pasture is very deficient.

19. *Ægopodium podagraria*, (L.,) Goat Weed, (p.) A foreign weed, troublesome and difficult to eradicate.

20. *Cicuta maculata*, (L.,) Water Hemlock, spotted cowbane, musquash root, (p.) The root of this is poisonous, and proves fatal to children who collect and eat it by mistake for the root of sweet cicely, *osmorhiza longistylis*, (D. C.) It is found indigenous along rivulets and margins of swamps, and should be carefully eradicated.

21. *Conium maculatum*, (L.,) Common or Poison Hemlock, (b.) A poisonous and dangerous weed, introduced from Europe, and occasionally met with about old settlements. It is supposed to be the identical herb with which the ancient Greeks put their philosophers and statesmen to death when they got tired of them.

DIVISION II.—GAMOPETALOUS EXOGENS; *Petals more or less united.*

22. *Sambucus canadensis*, (L.,) Common Elderbush, (s.) This indigenous shrub is very tenacious of life, and inclined to spread extensively along fence-rows and hedges, giving the premises a very slovenly appearance.

23. *Dipsacus sylvestris*, Mill Teasel, wild teasel, (b.) This coarse European weed is completely naturalized in some localities, and is not only worthless, but threatens to become a nuisance if not attended to.

24. *Vernonia noveboracensis*, Wild Iron Weed, (p.) A coarse native plant, quite common in moist, low meadow grounds, and along fence-rows. The root of this must be cut like the Canada thistle before the flowering season in spring, or the danger will be imminent of its over-running the whole area in a short period by means of its floating seeds.

25. *Eupatorium purpureum*, (L.,) Trumpet Weed, joe-pye weed, (p.) Several varieties of this tall, stout weed are indigenous on our moist low grounds.

26. *Aster ericoides*, (L.,) Heath-like Aster, (p.) Numerous species of this large American genus meet the eye of the farmer, in the latter part of summer, in his woodlands, low grounds, borders of thickets, &c., some of which are quite ornamental, but the little bushy one here mentioned is about the only one which invades our pastures to any material extent. In neglected old fields, it often becomes as abundant as it is always a worthless weed.

27. *Erigeron canadense*, (L.,) Horse Weed, butter weed, (a.) This American weed has diffused itself all over our country, and, it is said, has reached and pervaded all Europe. The cultivation of hoed crops will clear the fields of this pest. Other varieties of the same genus infest meadows, which, if the evil becomes too burdensome, must be ploughed up.

28. *Erigeron strigosum*, (Muhl.,) Flea-bane Daisy, (a.) This very common native weed is apt to be abundant in the first crop of upland meadow, after the

routine grain crop. After that, especially in good lands, it becomes more ;, being probably choked out, like many other weeds, by the valuable grasses.

!9. *Solidago nemoralis*, (Ait.,) Golden Rod, (p.) Several species of golden occur along fence rows, borders of woods and thickets, and intrude upon ected pasture fields.

30. *Ambrosia trifida*, (L.,) Great Rag Weed, (a.) A coarse, ugly native ed, common in waste places.

31. *Ambrosia artemisiæ folia*, (L.,) Bitter Weed, rag weed, (a.) This indi-ious, bushy weed occurs in most cultivated grounds, and is most abundant the stubble, after a crop of wheat. But if the land be good, the plant ms to be smothered or choked out the next season by the usual succeeding p of clover and the grasses. It is always ready, however, to make its ap-arance whenever the grassy turf is broken up by the plough.

32. *Xanthium strumarium*, (L.,) Clot-weed, cockle-bur, (a.) This vile weed, obscure origin, has the appearance of a naturalized stranger in our country, d seems, fortunately, not much inclined to spread. The burs are a great an-yance in the fleeces of sheep.

33. *Xanthium spinosum*, (L.,) Thorny Clot-bur, (a.) This execrable foreign ed is fast becoming naturalized in many portions of our country, particularly the southern States. It may be frequently seen also along the sidewalks d waste places in the suburbs of our northern seaports. It is stated that the ities of a southern city a few years since enacted an ordinance against e offensive weed, in which enactment it was denounced by the misnomer of Canada thistle." This plant may be destroyed with the hoe in the latter rt of summer—in September.

34. *Bidens frondosa*, (L.,) Bur Marigold, (a.) Worthless native weeds in lens, corn fields, &c., and particularly disagreeable by reason of the barbed ns of the fruit, which adhere in great numbers to clothing.

35. *Bidens bipinnatus*, (L.,) Spanish Needle, (a.) This, like the preceding, not carefully watched and extirpated, is a great pest in cultivated lots. nother species, *B. Chrysanthemoides*, (Mx.,) known as Beggar-ticks, is ther showy, with its head of yellow-rayed florets, and is frequently found ong swamps and rivulets in autumn. They are all regarded as nuisances on count of their adhesive fruit.

36. *Maruta cotula*, (D. C.,) May-weed, fetid chamomile, (a.) A disagreeable tle foreign weed, which is extensively naturalized, and in bad odor among us.

37. *Achillea millefolium*, (L.) Yarrow, milfoil, nose-bleed, (p.) English cultural writers speak of it as a plant of some value in their pastures; but is generally regarded in this country as a mere weed. Certainly it is far in-rior to our usual pasture plants, and our cattle are rarely, if ever, observed to it.

38. *Leucanthemum vulgare*, (Lam.,) Ox-eye, daisy, white weed, (p.) This truder from Europe has obtained almost exclusive possession of many fields eastern Pennsylvania, and the prospect of getting rid of it appears to be arly hopeless. Its propagation and diffusion are so rapid and irresistible that negligent sloven may become the source of a grievous annoyance to a whole ighborhood. The cultivation of hoed crops a few years will rid a field of this struction to useful vegetation. The Corn Marigold, *Chrysanthemum lege-m*, (L.,) a kindred plant, which is said to be such a pest to the agriculture of e Old World, happily does not appear to have found its way as yet to the nited States.

39. *Erechthites hieracifolia*, (Raf.,) Fire Weed, (a.) This coarse native ed is remarkable for its prevalence in newly-cleared grounds, especially in d around the spots where brush-wood has been burnt; hence its common of "fire-weed."

40. *Senecio vulgaris*, (L.,) Common Groundsel, ragwort, (a.) A homely

worthless little herb, which Professor De Candolle remarks migrates almost everywhere with European men. It is naturalized about the seaports of the northern States, and has lately appeared in eastern Pennsylvania.

41. *Centaurea cyanus,* (L.,) Ragged Robin, blue bonnets of the Scotch, (a.) This European plant is often seen in our gardens, and in some places is gradually straggling into cultivated fields. As it is considered a troublesome weed among the grain crops of the Old World, it should be watched here, so as to prevent the *blue bonnets* from "coming over the border."

42. *Cirsium lanceolatum,* (Scop.,) Common Thistle, (b.) This foreigner, which delights in a rich soil, is abundantly naturalized in Pennsylvania and in the northern States generally. It is a very objectionable weed on our farms, requiring constant vigilance and attention to exclude or keep it in subjection. If permitted to mature its fruit, the expanded pappus may be seen by thousands floating the akenes through the air, and disseminating the obnoxious intruder far and wide. The common thistle, having no creeping roots, is not so obstinate in resisting extirpation as some other varieties. It is easier destroyed if the roots are cut with sufficient care before its flowering season.

43. *Cirsium horridulum,* (Mx.,) Yellow Thistle, (b.) This rugged, repulsive species looks like a stranger here, being hitherto chiefly restricted to the sandy sea-coast of New Jersey. It is certainly desirable that it should continue to be a stranger to every agricultural district.

44. *Cirsium arvense,* (Scop.,) Canada Thistle, (p.) This is perhaps the most pernicious and detestable weed that has as yet invaded the farms of our country. Though miscalled "*Canada thistle,*" it is believed to be indigenous to Europe, and has probably acquired that name by reaching us *via* Canada. The rhizoma or subterranean stem (which is perennial and very tenacious of life) lies rather below the usual depth of furrows, and hence is not destroyed by common ploughing. The rhizoma ramifies and extends itself horizontally in all directions, sending up branches to the surface, where radical leaves are developed the first year, and aerial stems the second year. The plant—that is, the aerial portion—appears to die at the end of the second summer like a biennial, but it only dies down to the rhizoma or subterranean stem. The numerous branches sent up from perennial rhizoma soon furnish prickly radical leaves, which cover the ground so as to prevent cattle from feeding where those leaves are. Nothing short of destroying the perennial portion of the plant will rid the ground of this pest; and this has been accomplished by a few years of continued culture, (or annual cropping of other plants which require frequent ploughing or dressing with the hoe,) so as to prevent the development of radical leaves, and thus deprive the rhizoma of all connexion or communication with the atmosphere. We have a few other thistles which are all worthless weeds; but not being so obnoxious as the preceding, it is not deemed necessary further to notice them here.

45. *Lappa major,* (Gaertn,) Burdock, (b.) Everybody knows this coarse homely foreign weed, one of the earliest and surest evidences of slovenly negligence about a farm-yard.

46. *Cichorium intybus,* (L.,) Wild Succory, chiccory, (p.) This foreigner is becoming extensively naturalized. Some European agriculturists recommend it as a valuable forage plant, and cattle seem fond of it; though it is believed to impart a bad taste to the milk of cows which feed upon it. In Europe the roasted root is used as a substitute for coffee. In this country the plant is generally regarded as an objectionable weed.

47. *Taraxacum dens-leonis,* (Desf.,) Dandelion, (p.) An introduced plant, and now so extensively naturalized in our grass-plots, fields, and meadows that although not very obnoxious as a weed, it will be found a difficult task to extirpate it. The leaves and flower buds are frequently used, wilted, as a salad, and boiled as "greens," and the root has been much employed recently in de-

economy, and is esteemed a pleasant and salutary substitute for the
ɩerry.

Lobelia inflata, (L.,) Eye-bright, Indian tobacco, (b.) A native weed ing acrid properties, and sometimes employed as an emetic, and as an ɩrant in asthma.

Andromeda mariana, (L.,) Stagger-bush, (s.) This native shrub is ɔundant in the sandy districts of New Jersey, where it is reputed to be ɩs to *sheep* when the leaves are eaten by them, producing a disease called :aggers." The evidence on this point is not quite conclusive, but if es- ɔd would cause the bush to be deservedly ranked among the pernicious

Plantago major, (L.,) Common plaintain, way-bread, (p.) This foreign remarkable for accompanying civilized man, growing along his foot- ɩnd flourishing around his settlements. It is alleged that our aborigines "the white man's foot," from that circumstance. Another foreign spe- *P. lanceolata*, (L.,) known as English plaintain, rib-wort, ripple-grass, ckhorn plaintain, is becoming particularly abundant in our upland mead- clover grounds. The farmer should keep its seeds from mingling with f the red clover, and thus injuring the sale of clover seed in the market.

Tecoma radicans, (Juss.,) Trumpet-flower, (p.) This showy native : is often cultivated and admired in the Northeastern States, but in the along the Ohio river and its tributaries, it is regarded as an intolerable :e.

Verbascum thapsus, (L.,) Common Mullein, (b.) An introduced, homely n our pastures and cultivated grounds. There is no surer evidence of a y and negligent farmer than fields overrun with mulleins. As the plant es a vast number of seeds it can only be kept in due subjection by eradi- before the fruit is mature. There is another species called moth mullein, *ttavia*, (L.,) more slender, and equally worthless, becoming frequent in ıtures.

Linaria vulgaris, (Mill.,) Toad-flax, Ranstead-weed, (p.) A rather showy, d weed, said to have been introduced into Pennsylvania by a Mr. Ran- rom Wales, as a garden flower. It inclines to form large, dense patches ɔastures by means of its creeping roots, which take almost exclusive ion of the soil.

Nepeta cataria, (L.,) Cat-mint, cat-nip, (p.) This is common about old ents. Another perennial species, *N. Glechoma*, (Benth.,) called ground- d gill, is also common in moist, shaded places about farm houses.

Lamium amplexicaule, (L.,) Dead nettles, hen-bit, (a.) A worthless eed, abundant in and about gardens in the Middle States, requiring some ɩn to keep it in due subjection.

Leonurus cardiaca, (L.,) Motherwort, (p.) A homely, obnoxious weed, n waste places about houses and farm-yards.

Teucrium canadense, (L.,) Wood-sage, germander, (p.) This native which is frequently seen in low, shaded grounds along streams, where it ɜss. has recently got into the fields of some of the best farms of eastern ɩvania, where it is now regarded as an obstinately persistent nuisance.

Echium vulgare, (L.,) Blue-weed, vipers bugloss, blue devils, (s.) A but vile weed, extensively naturalized in some portions of our country, lly in Maryland and in the Shenandoah valley, Virginia. Wherever it ɩts appearance the farmers should act promptly on the Ovidian maxim, *:ipius obsta*," &c.: Meet and resist the beginning of evil.

Echinospermum lappula, (Lehm.,) Stick-seed, beggar's lice, (a.) The y farmer is apt to get practically and vexatiously acquainted with this ɩus native weed in consequence of its racemes of bur-like fruit entang- ; manes of his horses and the fleeces of his sheep.

60. *Convolvulus arvensis*, (L.,) Bind-weed, (p.) This foreign plant has been introduced into some portions of our country, and will give the farmers much trouble if they do not carefully guard against it.

61. *Cuscuta epilinum*, (Weihe.) Dodder, flax-vine, (a.) This remarkable parasitic plant, somewhat resembling copper-wire in appearance, was introduced with our flax crop, and was formerly a great pest in that crop, by winding round and entangling branches of stalks so as to spoil them; but the vine has become rare, and has nearly died out since the culture of flax has declined among us.

62. *Solanum nigrum*, (L.,) Night-shade, (a.) Frequent in shaded, waste places about dwellings. It is reputed to be deleterious in its properties, and ought, therefore, to be carefully excluded from the vicinity of all farm-houses, where its berries may tempt children to "pluck and eat."

63. *Solanum carolinense*, (L.,) Horse Nettle, (p.) An exceedingly pernicious weed, and the roots are so penetrating and so tenacious of life that it is difficult to get rid of. It was probably introduced from the South by *Humphrey Marshall* into his botanic garden at Marshallton, Pennsylvania, whence it has gradually extended itself round the neighborhood, and forcibly illustrates the necessity of caution in admitting mere botanical curiosities into good agricultural districts.

64. *Datura stramonium*, (L.,) Thorn Apple, Jamestown (or Jimson) weed, (a.) Two varieties of this coarse, fetid, narcotic plant (which is probably of Asiatic origin) are common among us as an obnoxious weed, and they should be carefully excluded from the vicinity of all farm-houses.

65. *Enslenia albida*, (Nutt,) Whitish Enslenia, (p.) This twining plant, allied to the Asclepias or Milk-weed family, and happily as yet unknown to the farmers of the eastern States, is reported by Prof. Short, a distinguished botanist of Kentucky, to be an intolerable nuisance on the farms along the river banks in Ohio, Illinois, &c.

Division III.—Apetalous Exogens; *Corolla usually wanting.*

66. *Phytolacca decandra*, (L.,) Poke-weed, pigeonberry, (p.) This stout native is everywhere frequent in rich soil. The *turions*, or tender radical shoots, in the spring of the year afford a popular substitute for those of asparagus; nevertheless, the plant is regarded and treated as a weed by all neat farmers.

67. *Chenopodium album*, (L.,) Lamb's Quarter, goose-foot, (a.) This coarse and rather homely weed has become common and quite troublesome in gardens.

68. *Amaranthus hybridus*, (L.,) Pig-weed, (a.) A repulsive looking weed, an annoyance in gardens and cultivated lots in the latter part of summer. If permitted to mature its seed it soon becomes very abundant.

69. *Amaranthus albus*, (L.,) White Amaranth, (a.) Another coarse weed in the farm yards of the middle States. Although supposed by some to be a native of Pennsylvania, it has a foreign habit and appearance, and probably came from tropical America.

70. *Amaranthus spinosus*, (L.,) Thorny Amaranth, (a.) This odious bushy weed, supposed to be a native of tropical America, is common in unfrequented streets and outskirts of our seaport towns, and is a vile nuisance wherever it appears. It cannot be too sedulously guarded against. Hoeing on its first ap- [illegible] is often effectual for its destruction.

[illegible] *[illegible]ygonum pennsylvanicum*, (L.,) Knot-weed, (a.) A common worthless [illegible] road sides and in waste places about neglected farm-houses.

[illegible] *[illegible]lygonum pucica[illegible]*, (L.,) Lady's Thumb, spotted knot-weed, (a.) Re- [illegible] smaller, but equally worthless wherever in- [illegible]

[illegible] Pepper, smart weed, (a.) A natu-

weed as worthless as most of the .species are, though this is even more oxious than the preceding, being a highly acrid plant, and sometimes causing ostinate ulcerative inflammation when incautiously applied to the skin.

74. *Polygonum sagittatum*, (L.,) Arrow-leaved Tear-thumb, (a.) Mowers haymakers are apt to be familiar with this annoying native weed in the nd crop of swampy meadows. Another kindred species, viz. *Parifolium*, L.,) or Halbert-leaved Tear-thumb, is an accompanying and equally obnoxious 'eed. Ditching and draining are the remedies for the evil. Several other *'olygonums* occur, equally worthless, but rather less offensive.

75. *Rumex crispus*, (L.,) Sour Dock, curled dock, (p.) An unsightly and bjectionable foreign weed, too extensively known.

76. *Rumex obtusifolius*, Bitter Dock, broad-leaved dock, (p.) This foreign pecies is now more objectionable than the preceding, but is not quite so prevant. There is also a little foreign species, well known for its acidity—the *R. cetosella*, (L.,) Field or Sheep Sorrel, (p.,) often so abundant as to be a nuisance a the farm. Improving the land, especially by adequate dressing of lime, is elieved to be the best mode of expelling this and many other obnoxious eeds.

77. *Euphorbia hypericifolia*, Eye-bright, spurge, (a.) This is a common eed in dry pasture fields, especially in thinnish sandy soils, and has been susd (how justly has not been determined) as the cause of the disagreeable vation or slabbering with which horses are sometimes affected in the latter of summer. There is another flatty, prostrate, bunching little species, *E. culatc*, (L.,) often abundant in Indian cornfields and other cultivated s.

78. *Urtica dioica*, (L.,) Nettle, stinging nettle, (p.) An exotic rather frequent e places about farm houses, well known to those who have come in conwith them.

Class II.—Endogenous Plants; *Inside Growers.*

79. *Symplocarpus fœtidus*, (Salish,) Swamp Cabbage, skunk weed, (p.) A orthless native weed in wet and swampy meadows, readily known by its skunkke odor when wounded.

Sagittaria variabilis, (Englin,) Arrow-head, (p.) A common native no value, found in sluggish ditches and swampy meadows. The roots, base of stem, often produce large oval tubers in autumn, which tempt hogs to ot for them, and thus disfigure the grounds in which they occur.

81. *Anacharsis canadensis*, (Planchon, Udora, Nutt,) Water-reed, (p.) This aquatic is supposed to be indigenous in our sluggish streams, where it abounds, and may possibly become troublesome in our canals. It has ntroduced into England, where its presence impedes the navigation of the s to a serious extent.

Smilax rotundifolia, (L.,) Green Brier, rough bindweed, (p.) This is ion in thickets, and a variety of it, S. Caduca, (L.,) often abounds in poor, cted old fields.

83. *Ornithogalum umbellatum*, (L.,) Ten O'clock, (b.) This exotic from the is in many places multiplies its bulbs so rapidly as to alarm the farmer, glected. The bulbs are exceedingly tenacious of life, and when once in on of the soil, it is an almost hopeless task to get rid of them.

84. *Allium vineale*, (L.,) Field Garlic, crow garlic, (p.) Tradition says this was introduced by the first Welsh immigrants to Pennsylvania for the pose of affording an early pasture, particularly for sheep. It was formerly lant in some districts as to be quite an annoyance, by imparting a disflavor to milk and butter, and injuring the manufacture of wheat flour. d farming and a judicious rotation of crops the evil has been much a.

85. *Juncus effusus*, (L.,) Common or Soft Rush, (p.) There are nu species of this worthless native weed, but this is the best known, and p the most objectionable, as it has a constant tendency to form unsightly bu or *tussocks*, in moist low grounds. Mr. Elliott, an eminent botanist, sa in South Carolina this Rush occupies and almost covers rice fields as they are thrown out of cultivation.

86. *Cyperus phymatodes*, (Muhl., Nut.,) Grass of Florida, (p.) This is fortunately somewhat rare, as yet, in the northern and middle States is a great pest to the agriculture of the South.

87. *Cyperus hydra*, (Mx.,) Coco grass, nut grass of South Carol This is regarded by the southern planters as the most intolerable pest agriculture. Mr. Elliot says: "It shoots from the base of its stem a like fibre, which descends perpendicularly eight to eighteen inches, an produces a small *tuber*. From this horizontal fibres extend in every di producing new tubers at intervals of six or eight inches; and these imme shoot up stems to the surface of the earth, and throw out lateral fibres a new progeny. This process is interminable, and it is curious to see chain or net-work of plants and tubers can, with some care, be dug up in soil. The only process yet discovered by which this grass can be ext is to plough or hoe the spots in which it grows every day through the season. In their perpetual efforts to throw their leaves to the light th become exhausted and perish; or, if a few appear the next spring, th easily be dug up."

88. *Carex tentaculata*, (Muhl.,) Many-beaked Sedge, (p.) A very c species, in swampy low ground, of the large and unprofitable genus of

89. *Carex stricta*, (Lam.,) Tussock Sedge, (p.) This is one of th common, and most difficult to manage, of all our sedges. Its roots are form large dense tufts or "tussocks" in swamps. The careful farmers times get rid of those tussocks by digging them out, and, when dry, col them in large heaps, burning them, and using the ashes as a manure. (remarkable and very numerous genus, (Carex,) Dr. F. Boott, an accom botanist of London, has now in hand one of the noblest and most elab illustrated monographs ever issued from the press.

90. *Panicum sanguinale*, (L.,) Crab grass, finger grass, (a.) In the States this troublesome grass abounds in gardens in the latter part of su and is frequent also in Indian corn fields, but may be kept in tolerable tion by the early and faithful use of the instrument known as the "culti The crab-grass is regarded as a serious pest in the plantations along the Mississippi.

91. *Panicum capillare*, (L.,) Hair-like Panicum, "Old Witch" gra This worthless species flourishes best in a light sandy soil, but is usuall ess abundant in corn-fields. In autumn the dry culms break off a ght-spreading panicles are rolled over the field by the winds, until the late in great quantities along fence and hedge rows.

92. *Panicum crus-galli*, (L.,) Cock-foot Panicum, barn-yard gras This coarse homely grass is said to be an inhabitant of all quarters of the t is usually found in the latter part of summer, rather abundant along barn yards and other waste places.

aria glauca, (Beauv.,) Bristly Fox-tail grass, (a.) All our wc this genus are believed to be naturalized strangers here. Tl akes its appearance in abundance among the stubble, after a nd is frequent in pastures, orchards, &c., when not kept down by h. The *S. viridis*, (Beauv.,) called green fox-tail or bottle ly worthless but not quite so prevalent.

The adhesive bristles of this s

frequenting gardens and neglected lots, are calculated to make it something of a nuisance if permitted to become abundant.

95. *Cenchrus tribuloides*, (L.,) Bur grass, hedge-hog grass, (a.) This pestilent nuisance is quite abundant in the sandy districts of New Jersey and along the great northern lakes.

96. *Cynodon dactylon*, (Pers.,) Dog's-tooth grass, Bermuda grass, (p.) Of this grass, which has found its way from Europe into Virginia and other southern States, Mr. Elliot remarks: "The cultivation of it on the poor and extensive sand-hills of our middle country," (viz., in South Carolina,) "would probably convert them into sheep-walks of great value; but it grows in every soil, and no grass, in close rich land, is more formidable to the cultivator. It must, therefore, be introduced with caution."

97. *Bromus secalinus*, (L.,) Cheat, chess, broom grass, (a.) This is a well-known intruder among our crops of wheat and rye, and often appears in the same fields for a year or two after those crops, but it is soon choked out by the perennial grasses.

This plant is an annual, and easy to overcome by care in sowing clean wheat, by keeping fence corners and field borders clear, and in establishing a proper rotation in cropping. The vulgar error, that this grass is merely *transmuted wheat*, came to us with the earliest immigrants, and, notwithstanding the boasted "march of mind," it yet prevails among a certain class of farmers to a considerable extent.

98. *Triticum repens*, (L.,) Couch grass, Quitch grass, (p.) This species of *triticum*, which is quite distinct in habit from the cultivated wheat, has found its way into some districts of our country, and is a pernicious intruder, when fully introduced, by reason of the exceeding tenacity of life in its rhizomas, or creeping subterranean stems.

99. *Andropogon nutans*, (L.,) Wood grass, Indian grass, (p.) This and two or three other species of native Indian grasses are common in our sterile grounds, and are no better than mere weeds.

SERIES II.—CRYPTOGAMUS, *or Flowerless Plants.*

100. *Pteris aquilina*, (L.,) Brake, bracken of the Scotch, (p.) This large *fern* is often abundant in moist woodlands and borders of thickets, and in our wild forests it affords a favorite shelter, or hiding-place, for deer and other game, but it is little better than a weed on the farm.

Having thus disposed of the most prominent weeds in our agriculture, it remains merely to mention, very briefly, three or four of the injurious cryptogams, among the lower order of the fungi, viz:

Merulius lachrymans, (Schum.,) Dry-rot. This fungus, with some others which infest timber in places where a damp air is confined, as in houses and ships, is very injurious. It is said to be remedied by a wash of diluted sulphuric acid.

Ascophora mucedo, (Link.,) Mould, bread-mould. This minute fungus usually abounds on moist decaying substances, and is well known to housewives as growing plentifully on bread and pastry which have begun to "spoil;" yet it is ble that many of them have never suspected it of being as genuine a plant ny weed that grows on the farm.

Uredo segetum, (Pers.,) Blight, smut, brand. This is usually found within the glumes and fruit of wheat, barley, and other grasses, speedily filling the whole with a profuse black dust.

Puccinia graminis, (Pers.,) Mildew, rust. This often operates injuriously on wheat crops in warm, close, foggy weather, near harvest time; especially where the crop is a little backward and mingled with grass or herbage.

OBSERVATIONS ON ATMOSPHERIC HUMIDITY.

BY J. S. LIPPINCOTT, HADDONFIELD, N. J.

To a large and intelligent class of readers of the Agricultural Department reports, grape-growing has become an object of absorbing interest. Those of this class who may have read a paper on "The Climatology of American Grape Vines," in the report for 1862, and its continuation under the title of "Geography of Plants," in that for 1863, will have observed that success was promised in certain zones of summer temperature, provided the atmospheric humidity were not there deficient, either permanently or for the season. This element, so variable, seems scarcely less important than that of the mean temperature of the growing season. Experience derived from the failure of the grape crop of 1864 and 1865, over wide regions deficient in humidity, and its success in others where this element must have been abundant, have set its value in a clearer light than heretofore.

In seasons not marked by extreme fluctuations of atmospheric humidity, and accompanying reductions of temperature in midsummer, the isotherms which bound the grape-growing belts, as heretofore described, limiting the regions adapted to certain varieties of grapes, may still be esteemed as normally correct and reliable; but in seasons of exceptional character, when extremes of humidity occur, and, with them, extreme high temperatures followed by great reduction of atmospheric moisture, (and oftentimes accompanying sudden decline during the night to near the freezing point,) such isotherms cease to be the guiding clews to the regions adapted to any special variety of grape, or, indeed, to indicate that any grape can be therein successfully cultivated. There are few physical laws which can be realized with mathematical exactness, but they are generally approximations, more or less false, in each particular case. "These laws are ideal truths towards which nature tends, but which are never fully reached. Even as respects the law of gravitation, there always have been residual phenomena unexplained by the law; and so, probably, there always will be as our generalizations widen towards the great Presence of which all natural phenomena are the direct manifestation."

We have hitherto regarded the conditions of temperature as of primary importance. Though the amount of moisture in the atmosphere of each locality may be of nearly equal value, we have not the data for determining the proportions of this ingredient demanded for the successful culture of many of our garden and field products.

With regard to the grape, we are better prepared to discuss the question of the climatic value of excessive or diminished relative humidity. The very favorable reception awarded our former efforts, encourages the hope that the present will prove suggestive, if not instructive.

As a necessary consequence of the evaporation continually going on over the entire surface of the earth, the atmosphere at all times contains a proportion of vapor of water, the amount of which is perpetually varying. This amount is almost always below the proportion which experiment has shown to be the greatest degree possible at the observed temperature. It is owing to this circum-

ınce that the air is rarely fully charged with vapor—that wet bodies become y, and that the surface of the soil, although saturated with moisture, yet in a w hours becomes parched and dusty. By the process of evaporation from e surface of the land, as well as of the ocean, a natural distillation is thus conıually carried on, and a perpetual circulation of waters maintained—those conyed by the rivers into the sea being returned by invisible channels through e atmosphere to form clouds, which shall restore to the streams, by means of their perpetual tribute to the ocean.

Upon variations in the quantity of moisture present in the atmosphere, many the great peculiarities of our climate mainly depend. The frequency of rain, d many other meteorological phenomena of the highest interest and importance, greatly influenced by the proportions of humidity present in the atmosphere any locality. To attain an accurate knowledge of the quantity of aqueous por which exists at any given time in a certain bulk of air, becomes, there- e, a problem which is constantly requiring solution. Instruments employed this purpose are termed hygrometers. Various methods have been devised ascertaining the proportion of moisture in the air; and the simplest and the ıst accurate of these consists in the determination of the dew-point, or temrature to which the air must be reduced so that its moisture shall begin to parate and condense upon cold surfaces. This difference, alone, is sometimes ed to express the dryness of the air, or the reduction of its moisture below the int of saturation. The determination of the dew-point may be readily made, a summer's day, by noting with a delicate thermometer the exact temperare of water in a glass, at the moment deposition of vapor ceases to be made. om this temperature, and that of the air at the same time, the tension (presre, or force) of the aqueous vapor present in the air, as exerted on the column mercury in a barometer, may, by means of tables constructed for this purse, be readily ascertained; and the corresponding proportion of moisture (or relative humidity or percentage of saturation) be easily learned.

The above method, apparently so simple, is not readily employed in general e, and has given place to the wet-bulb thermometer, or August's Psyrometer, which for simplicity and ease of manipulation leaves nothing to be d. This consists merely of two similar delicate accurate thermometers, side by side on the same stand, the bulb of one covered with thin muslin, ı is supplied with moisture and kept continually wet by capillary conducfrom a vessel beneath. The action of this instrument may be readily unstood by the uninitiated observer, who, with one hand wet and the other dry, expose them equally to a gentle current of air, on a drying day. He will need a thermometer to indicate which hand is most rapidly cooled, and that drier the day, the more his wet hand will become chilled below the other. us it is with the "wet and dry bulb" thermometers. The wet bulb thermeter will exhibit decline in temperature if the air be not already saturated h moisture, and evaporation thereby prevented. The rate of evaporation, l consequently the depression of temperature in the wet-bulb instrument, l be greater in proportion as the air is further from the point of saturaı. To determine the exact amount of vapor present, and the proportional ree or percentage of saturation, tables have been prepared which greatly ate the study of hygrometry; the best of which are those published ıne Smithsonian Institution, at Washington. Without such tables, the ications of the Psychrometer, except when very near saturation, can be vaguely defined, since the amount of vapor contained in the air, at time, is reduced by a fall in temperature, more rapidly than in direct portion to the fall; for while the temperature changes in arithmetical, the ıidity varies in geometrical progression. It should be understood that the ıunt of vapor held in the air over any district is very variable—perhaps con-

stantly changing in amount. The colder the air, the less the vapor it can hold; and the warmer the air, the more it may contain. But it does not follow that there must necessarily always be more vapor in the air at a high temperature than at a lower one. Air at a given temperature will hold a certain quantity of vapor, and no more; but it may hold any quantity less. If heated, it may absorb more, (if not already full or saturated,) if it can gain access to it, or to water. If already full, it will lose a part of it on being chilled. The definite quantities of vapor which air will hold at certain temperatures, by Fahrenheit's thermometer, are as follows: At zero the weight of vapor in a cubic foot of saturated air has been estimated at about three-quarters of a grain; at 32°, 2⅛ grains; at 40°, 3 grains; at 50°, 4¼ grains; at 60°, 5⅞ grains; at 70°, 8 grains; at 80°, nearly 11 grains; at 90°, 14½ grains; at 95°, 17 grains, and at 160°, nearly 20 grains of vapor in each cubic foot.

When an atmosphere of very high temperature is loaded with all the vapor it can hold, as at 95°, saturated with 17 grains for every cubic foot, it becomes very oppressive to the people of the district sustaining it, and sometimes destructive to life. A consideration of the above numbers will explain the general extreme humidity of the climates of warm countries. The amount of vapor in the air is not generally expressed in grains in each cubic foot, but in inches of pressure on the barometer, and in degrees of relative humidity, 100 being taken to represent saturation. This ever fluctuating element varies from hour to hour through each day, according to the changing temperature of the air, the action of the sun's rays, the presence or absence of clouds, and the force of the wind. It may be reduced almost, if not quite, to a nullity, or may rise at high temperatures until it presses upon the barometer with a force measured by two inches of its column. Throughout the year it is generally least or lowest in the morning about sunrise, when a portion has been deposited as dew or frost; and greatest or highest at 2½ p. m., or about the period of greatest heat; and declines again in the evening, but not to the low measure of the morning. These are the mean average conditions, but it may be, and it often is, greatest in the morning, lowest at noon, and lower in the evening than at the morning observation. It is at its lowest point, generally, in January, when we have observed about one hundredth of an inch; increases in February, and advances in quantity as the season progresses, until it reaches its greatest amount in August, during the periods of greatest heats; then declines with the decline of heat, the humidity of autumn being in advance of that of spring. The highest we have observed the pressure of vapor was on the 7th of July, 1864, when it affected the barometer to the extent of 1.235 inch, the thermometer being at 90° at 2 p. m., and on the 26th of June, 1864, 1.053 inch at 2 p. m., thermometer at 96°, both of which were followed by rain in one to three hours—the last with lightning and tornado blasts of wind.

eral idea of the comparative mean force of vapor in the air near Phila-
nay be gained from the following table of the results of reductions for
's past:

' vapor.	In inches.		Force of vapor.	In inches.		Force of vapor in 1864–'65.		
						Lowest.	Highest.	Range.
1..........	.167		1865—March..........	.219		.05	.280	.230
....	.237		April..........	.285		.115	.440	.325
....	.438		May..........	.399		.189	.857	.668
pring......	....	.280	Mean for spring......	....	.301			
....	.472		1865—June..........	.667		.213	1.053	.840
....	.543		July..........	.671		.276	1.235	.959
st..........	.659		August..........	.687		.327	.856	.529
mmer......	....	.558	Mean for summer......	....	.675			
mber......	.462		1865—September....	.646		.255	.744	.489
er..........	.306		October..........	.332		.168	.723	.555
nber......	.253		November......	.242		.103	.537	.434
itumn......	....	.340	Mean for autumn......	....	.405			
nber......	.170		1865—December......	.194		.059	.407	.348
ry..........	.110		1866—January......	.133		.021	.376	.355
uary......	.142		1866—February......	.164		.043	.349	.306
nter 1864–'5	....	.105	Mean for winter 1865-'6	....	.163			
ar..........	....	.327	Mean for the year....	....	.386			

e above table it will be seen that the mean pressures of vapor for the ' 1864 and 1865 were nearly identical; that for the dry summer of 1864 s than that of 1865, which was not in this region so marked by drought; September, 1865, greatly in excess of that of 1864, as will be remem- many who suffered from the oppressive dampness, and by those whose ere destroyed by rot in that month; that the mean for autumn, 1865, efore greater than for the previous year, and, finally, that the past winter been more moist than its predecessor, and for the entire year rather ian that of 1864; all of which is in perfect accordance with our general ns from empirical observation.

osolute amount of vapor present in the air, as measured by the baro- es not express the dryness or humidity as generally affecting our feel- he health of vegetation, but it is the evaporating power of the air which concerns us to know, or its capacity to take up more vapor at the tem- observed, and to deposit a portion, or become saturated, by a loss of igh heats with abundant moisture, (or high relative-humidity,) are fa- o some crops at certain seasons, though injurious at others. High heat ess are as unfavorable to some as they are beneficial to others. In June, re observed many days of low humidity with low mean temperatures, by high heats with greater dryness. These proved injurious to the this region, ripening it too rapidly, drying its stem and berry before it ed, and preventing the elements necessary to its perfect development hing the grain in the gradual and timely manner needed for its perfect n. In June, 1865, were many days of moderate heat, none excessive, he mean was very high from the uniform greater heat than ordinary,) the greatest mean for July, but accompanied by unusual relative-hu- nore than 40 per cent. in advance of that of June, 1864,) and the wheat again injured, while the corn made a growth so extraordinary that it ubject of frequent remark, as exceeding anything remembered. The ; low relative-humidity of June, 1864, and of August, 1865, and the

excessive moisture in September, 1865, of which we shall have occasion to are instances of the vast utility of the presence of a due proportion of this ment. By the term "relative-humidity," is intended to express the a moisture existing in the air, compared with that which it could hold if satu at the same temperature. A clear comprehension of the meaning of the terms "tension," "force," or "pressure of vapor," as measured by the barometer, and of relative-humidity, as expressive of the percentage of saturation, are necessary to an understanding of the subject under discussion. Moreover, it must be remembered that the dryness expressed by the difference between the temperature of the air and the dew-point is not to be confounded with the dryness, as pressed by the percentage of saturation. The former method is not now ployed, having given place to the latter more philosophical mode of expre relative dryness or humidity. The dew-point can be as readily calculated from the psychrometer as can the tension of vapor and its relative amount, if desired.

The daily range of humidity is considered much greater in the Atlantic States than in Great Britain, or in other countries of western Europe. As a general rule, the dew-point is here many degrees below the temperature of the atmosphere, which is thus considerably removed from saturation. The following comparison of mean temperature, &c., observed and calculated for Haddonfield, N. J., for 1864 and 1865, with the means for seventeen years at Chiswick, near London, will exhibit these facts, though not in so striking a manner as observations made at more arid points in the interior of the country would present:

1864.	Mean temperature of year.	Mean dew-point of year.	Dryness or difference between temperature and dew-point.	Relative humidity or percentage of saturation.	Possible evaporation in a gentle breeze. From 1 sq. foot in grains per minute.	From 1 acre in gallons per day.	From 1 acre in tons.	Amount evaporated in inches.	Rain and snow. Am't deposited, as rain and snow, in inches.	Am't deposited, as rain and snow, in tons.	Possible evaporation and rain-fall compared. Excess of rain-fall over evaporation, in inches.	Excess of rain-fall over evaporation, in tons.	Excess of evaporation over rain-fall, in inches.	Excess of evaporation over rain-fall, in tons.
Haddonfield, New Jersey.														
Entire year	52.73°	43.72°	9.01	72.22	2.27	2,440	3,712	32.88	43.79	4,954	10.91	1,242	....	....
Summer	73.00	61.50	11.50	68.97	5.06	5,484	2,102	18.62	8.03	908	....	....	10.59	1,294
Winter	30.67	24.00	6.67	77.03	0.84	903	142	1.26	13.17	1,489	11.91	1,347	....	....
1865.														
Entire year	53.10	46.40	6.70	80.44	1.80	1,935	2,943	26.33	55.13	6,236	28.80	3,393	....	....
Summer	73.62	66.75	6.87	81.61	3.32	3,571	1,382	12.31	12.59	1,423	0.38	41	....	....
Winter	34.58	28.80	5.78	85.24	0.82	866	140	1.24	11.24	1,268	10.00	1,128	....	....
Chiswick, near London, England.														
Mean of seventeen years	49.88	44.31	5.57	83.70	1.32	1,419	2,161	19.11	24.40	2,760	5.29	599	....	....
Summer	62.21	54.56	7.65	77.60	2.68	2,904	1,115	9.86	?5.00	?565	....	....	?4.86	?550
Winter	38.95	35.64	3.31	91.30	0.60	645	249	2.20	?5.11	?578	2.91	329	....	....

By means of the average temperature, the mean dew-point, and tables showing the evaporative force per minute in grains from a definite space, we may determine the amount of evaporation which may take place from a lake or the soil, in a calm, in a gentle breeze, or when a fresh breeze is blowing. The latter tables, prepared by Dr. Dalton, have been accepted as correct; and from them we have calculated the amount of evaporation as expressed in the accompanying table. A few remarks in explanation may be needed.

The mean temperature at Haddonfield, New Jersey, six miles southeast of Philadelphia, in 1864, being 52°.73, and the dew-point, by calculation, 43°.72, the difference indicating the dryness is found to be 9°.01, or nearly 50 per cent. greater than that for 1865, and 60 per cent. greater than that for seventeen years at Chiswick, near London. The summer of 1864 was remarkably dry, and the dryness expressed by the difference between the mean temperature and the dew-point is as well pronounced, being 11½°, or 75 per cent. greater than that of 1865, and 50 per cent. greater than the Chiswick mean for seventeen years. The relative-humidity expresses the same results. The winters of 1864 and 1865 did not differ widely, but were twice as dry as those of Chiswick. As respects evaporation, it would, of course, be expected to prove much more active in so dry an atmosphere than at places or in seasons more humid. Accordingly the possible vaporization at Haddonfield, New Jersey, for the entire year having been at the rate of about 2.27 grains of water per minute for one square foot, the average motion of the air being nearly equivalent to a gentle breeze, on which this rate of drying has been shown to attend, the corresponding values in other quantities, as gallons per day, or tons per year, and inches in depth, may be readily determined, or may be found in the foregoing table. Thus, in 1864, nearly 33 inches or 3,712 tons of water might have been evaporated from one square acre, the air moving in a gentle breeze. Had the air been at rest or calm, nearly 1,000 gallons less per day, and 1,400 tons less per annum, to each acre, might be evaporated, than if a fresh breeze prevailed for the same period. During a strong wind, or a high wind, this increase of evaporating power becomes much enlarged; and when very dry, as winds are at times in the Mississippi valley, it blasts vegetation as with a breath of flame.

In the dry summer of 1864 the evaporation was probably much greater than the rain-fall, as the soil was parched to powder, and vegetation depleted of its moisture, drawn from beneath the surface, apparently to the amount of nearly 10.59 inches, or about 1,300 tons for the season. In the summer of 1865, which in this district was not uniformly dry, the possible evaporation and rain-fall were about the same. In the summer of 1864 the possible evaporation at Haddonfield was nearly twice as great as for the average of summers at Chiswick. The excess of evaporation over rain-fall at the latter place is doubtful, our data being unreliable. The results arranged in the foregoing table must be accepted as approximations only, since accuracy cannot be attained where the elements are so difficult of authentication.* Their general accordance with known facts renders them more reliable, while they serve to show the immense importance of the evaporating action which is constantly going on around us on so grand a scale.

The increased facilities for drying the soil existing in an open, cleared, level, ...ted country, become apparent on comparing the amount of water evapo... ...the rain-fal[illegible] Haddonfield in 1864 and 1865, and with similar re... [illegible] measurements made near the headwaters

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[illegible] of the surface, and a smaller amount of vapor [illegible] a surface of moist earth than from water, and in a [illegible] experiments of Gasparin, in France, indicate that the [illegible] at certain seasons, from one-tenth to one-sixth of [illegible] Williams show that land covered with trees or [illegible] covered with water, even to the amount of

Anthony's creek, a tributary of Green Brier creek, an affluent of the Kanawha 'er. The discharge of this creek, of which the area of drainage was carefully rveyed, was ascertained, by daily measurements for one year, to amount to 70 r cent. of the rain-fall, and 65½ per cent. of the average fall for five consecu- years.* The waters thus hastened off by the sloping mountain sides, or n among the leaves or into the soil or rocky crevices, and sheltered from aporation by forests, restore a much larger proportion of the rain to the rivers ectly. In this section, as generally in an open champaign country, where ying winds prevail and much land is exposed by tillage, evaporation may take ice to the extent of three-fourths of the rain-fall throughout the year, or more twice that fall for an entire summer. Hence the value of forests, as ar- s of evaporation, or as barriers against the sweep of drying winds, becomes vious.

If our reductions as tabulated appear excessive, we may refer to other results roborative. Thus, at Ogdensburg, New York, in one year, 19.94 inches were aporated during the summer months, and for the entire year 49.37 inches. Syracuse, New York, in one year, 23.53 inches were evaporated in the sum- r, and 50.20 inches during the entire year. At Salem, Massachusetts, the t of extensive observations, the annual evaporation was stated to amount to inches; and the same was reported to have been the result at Cambridge, issachusetts. Colonel Abert assumed, from many calculations, that the aver- evaporation for the summer at Baltimore, Maryland, is 19 91 inches, and it there escapes into the air from an open reservoir, in summer, twice as much ter in the form of vapor as falls therein as rain. (Blodgett's Climatology of United States.) Dalton and Hoyle's experiments on the actual amounts re- ved and retained by the soil and sinking therein determined the annual evap- tion in the moist climate of Manchester, England, to be 25 inches. A arison of our results with the above will enable the reader to decide upon ir probable correctness. As respects the contrasted climates of America and itain, the differences in dryness noted in the table are not dependent on the ative amounts of rain, for nearly twice as much falls at Haddonfield as at ndon in the course of a year. The rain-fall at the latter place is, however, quent and moderate; while at the former (and generally in the United States) rains are heavy and of shorter continuance, alternated with longer seasons fair, dry weather. The chief cause of the difference in dryness may be found the fact that the humidity of Britain is borne over it from the vapor-laden n, while the prevailing westerly winds waft our land moisture away from us vards the sea, drying us, instead of increasing our store of vapor.

ATMOSPHERIC DRYNESS AS AN AID TO RADIATION AND PREVENTIVE OF UNSEASONABLE FROSTS.

One of the peculiarities of the district of lower New Jersey, where frequent itrumental observations have been made by the writer, is a general freedom excessive humidity, even during periods of very high heats. At no time ig the months of June, July, or August, 1864, did the humidity of the air saturation; nor did it hold as much moisture as it was capable of absorb- The climate is consequently, in a great measure, free from those seasons extremely hot and oppressive weather so overpowering to many persons in other localities. The summers are not, however, free from high heats; y are, on the contrary, very warm in districts remote from the sea—a maxi- of 96° having been occasionally experienced. These, and many other ons of extreme warmth, were not attended by excessive humidity, but by t dryness or low relative-humidity. Instead of approaching saturation, the

* Ellet on the Mississippi and Ohio rivers.

amount of vapor in the air was generally but from forty to sixty per cent what it might have held at the high temperatures noted.

The long continuance of this low humidity is unfavorable to the growth vegetation, and when reduced to a very low percentage, is the indirect caus accompaniment of a fall in temperature in some instances fatal to young pla If in June or July a few days of north or northwest wind, cool, dry, and sorbing moisture readily, blow over us, it bears away the moisture from the and from the soil and plants beneath. On such days may be seen those b ful white, massive, cumulus clouds which are produced by the elevation subsequent rarefaction and cooling of large masses of air containing v These clouds, which float so gracefully towards the east or southeast, "are the visible capitals of invisible columns of humid air," which are thus b away from us. The consequences of this removal of vapor are soon felt, that in a manner unmistakable, though until quite recently not clearly expl

The new researches into the phenomena of heat, which have overtu the old hypothesis of caloric and substituted the theory of vibrations, brought to light the extraordinary fact that vapor of water is opaque to the of heat of low intensity, such as that which proceeds from the soil and plants by night; in other words, that the heat of the earth cannot be ra or projected towards the sky if there exist in the air above the spot obser large proportion of aqueous vapor. Through pure air, free from moisture, heat may pass off as readily as if no air existed above the cooling region. believed that air saturated with moisture at the ordinary temperature abs more than five hundredths of the heat radiated from a metallic vessel filled boiling water, and Professor Tyndall calculates that of the heat radiated f the earth's surface warmed by the sun's rays, one-tenth is intercepted by aqueous vapor within ten feet of its surface. Hence the powerful influenc moist air upon the climate of the globe. Like a covering of glass, it allows sun's rays to reach the earth, but prevents, to a great extent, the loss by ra tion of the heat thus communicated.

In accordance with this theory, it should be shown that the withdrawal the sun from any region over which the atmosphere is dry, would be follo by quick refrigeration. It is said that the winters of Thibet are rendered alm unendurable from an uninterrupted outward radiation, unimpeded by aque vapor, and that everywhere the absence of the sun favors powerful radiat when the air is dry. "The removal for a single summer night of the aque vapor from the atmosphere that covers England would," says Professor T dall, "be attended by the destruction of every plant which a freezing tempera ture would kill." In the Sahara, where "the soil is fire and the wind is flame,' the refrigeration at night is painful to bear, so that ice is sometimes formed the "In short," says the Professor, "it may be safely predicted that wherever t air is dry the daily thermometric range, or the difference between the extre of heat and cold, will be very great." Illustrations of the truth of this positi may not be out of place here. They may now be found wherever we tu hough until the genius of a Tyndall demonstrated the cause of the phen ve failed to perceive their connexion. The student should avail himself of t nstructive and delightful pages of "Heat Considered as a Mode of Motion, b John Tyndall, F. R. S," which is pronounced "one of the most valuable a rofound books which this generation has produced, eloquent, simple, and clear, exemplifying the double genius of discovery and exposition." The title of t vork indicates the theory of heat held by its author, the only one now held by scientific men—it is a mode of motion.

All great discoveries have been partially anticipated by keen observers, ould not wholly explain certain anomalous appearances, but whose shrewdu ed them beyond the borders of the unknown. These results of Professor Tyn ll were thus foretold by R. Russell, esq., of Scotland, who visited America

o study the effects of our climate upon agriculture, and whose lectures on ılogy may be found in the Smithsonian report for 1854. He asserts, on ȝ5 of that report, that "the influences of moisture in tempering the sun's ı remarkable fact and well worthy of further investigation. When the ɔint is high, or the air is filled with moisture, radiation from the earth is d and the temperature of the night remains almost as high as that of . When the dew-point is low, the sun's rays pass without absorption th, and impart little of their heat directly to the air. The medium oınts are therefore most favorable to extreme heat in the atmosphere, and er heat beyond the tropics is probably owing to this cause. The fact amount of moisture in the air regulates the temperature of the nights ı received the attention it deserves." The great amount of moisture in within the tropics is the cause of the warm and brilliant nights. Radiation ne air and ground, under these conditions, seems to lose its power. On the ıd, travellers in all parts of the world inform us, incidentally, as to the ıon between dry air and cold nights. Mr. Inglis, in his travels through relates that he was oppressed by the hot rays of the sun in the valley of a while the hoar frost was lying white in the shade. Eastern travellers lesert often complain of the broiling heat of the air during the day, and hill temperature at night. Beautiful allusions to the same law are also in scripture, where it is related that one of the greatest hardships which experienced while tending the flocks of Laban, was that through the ıt by day and the frosts by night, sleep departed from his eyes." conclusions are confirmed by recent travellers in a remarkable manner. d no longer doubt the stories of Captains Riley and Paddock, as told in once incredible narratives, when they relate that the intense heat of the ıad scorched and blistered their bodies and limbs, so that they were covered ores, * * * while as soon as the burning sun had sunk be- ı the horizon, the fresh wind cooled the earth, which became even cold before , * * * to be followed by fierce and chilling blasts of wind. experiments of Captain Sabine, made on the coast of Africa, show that the sea breeze was blowing upon his station, the hygrometer denoted the point to be about 60°; but when the wind blew strong from the land it sunk ½°, the temperature of the air being 66°. Notwithstanding the heat of the ɔrating surface of the Sahara, the burning sands of the desert yield so little that there does not exist in the winds wafted to the coast, and which con- e the true harmattan, a greater force of vapor than that which rests upon Polar seas; for at both places the constituent temperature of the vapor, or point of deposition, is below 32°. The sea breeze above referred to contained per cent. of relative-humidity, the land breeze from the Sahara less than y per cent. of the same. (Daniels's Meteorological Essays, page 123.)

ıe desert and mountainous regions of our own continent furnish ample illus- ns of these phenomena of radiation. Captain Beckwith, in his narrative of Central Pacific Railroad survey, remarks: "We observed the greatest con- between the heat of the day and of the night in these mountain valleys, noon to 3 p. m. the thermometer standing at 87° to 90°, and at night falling w the freezing point."

Colonel Emory says: "On the 23d of October we retired with the thermom- at 70°, and awakened in the morning shivering, with the mercury marking , notwithstanding our blankets were as dry as if we had slept in a house." ıry's Military Reconnoissances in California, page 63.)

se low morning temperatures were found to characterize the whole country en Upper Mexico and the settlements near Great Salt Lake, the sunrise servations for three successive days being at 14° and 15°. At Salt Lake, h Territory, it is difficult to grow Indian corn, because of the extreme aridity ıe air, though the mean temperature is 10° above that necessary in a moist

climate. The local cooling at night, and the higher heats by day, are l unfavorable in this arid atmosphere.

R. E. Alison, who ascended the peak of Teneriffe in 1865, reports that ' the crater the extreme dryness of the atmosphere and the direct action of sun's rays were distressing. The lips cracked, the nails became brittle, evaporation from the wet-bulb thermometer so rapid that it was necessary watch it closely lest it should dry before an observation could be made. the height of 8,000 feet he suffered more from radiation than from cold. September the temperature in the shade was 40° Fahrenheit; the black b thermometer exposed to sunshine rose to 196°, or close to the boiling point water, at that elevation. At times it reached 210° Fahrenheit at lower poin while the nights were extremely cold, the dryness excessive, and the dew-poi frequently as low as 40° to 50° Fahrenheit." (Journal of Science, Jan 1866.)

To return to the researches of Professor Tyndall upon the cause of tl intense radiation on mountain tops and on desert plains, we may, in a few wor state that a long series of experiments with instruments of delicate constructi have demonstrated the truth of the hypothesis that these extreme reductions temperature are due to absence of humidity. They also show that the presen of a large proportion of vapor, even less than saturation, acts as would a dam flowing water, restraining the escape of heat by greedily absorbing it, and th though the air itself is a perfect vacuum as regards the rays of heat, the pr ence of humidity in considerable quantity renders it almost completely opaq to heat of radiation.

Such are the conclusions arrived at by the physicist in his laboratory. If tr they are of immense importance in their applications to meteorology, to clima and to human comfort. Perhaps they will explain some anomalies in our ex rience, clear up some difficulties in the study of climate, and enable us to prot ourselves from some of the injurious effects which follow extreme dryness certain critical periods. That they are great truths we have never seen dem strated outside of the lecture-room; but if sound, they must find ample evider to sustain them whenever instrumental observations shall have been prope applied thereto.

During the years 1864 and 1865, regular observations were made by the wri upon the temperature and humidity of his district, in Camden county, New J sey. Extremes of atmospheric dryness were noted on several occasions duri June and July of 1864, and at times in 1865. These extremes of low tempe ture appear to have been, in some way, dependent upon the periods of dryness a connexion which was not suspected until after the perusal of the volume bef named, in which is set forth, in a most luminous manner, the results reached the distinguished physicist already adverted to.

On June 11th, 12th, and 13th, before dawn, there occurred the remarkal reduction of temperature to 43°, 44°, and 44° respectively—temperatures mu lower, with one exception, than had been observed for nearly a month previo and 21° to 22° lower than the mean for June observations at 7 a. m. Tl remarkable reduction of temperature was felt throughout all the northern Stat from the extreme eastern point of Maine to Wisconsin, and from New Jersey Missouri, and even in Utah. The coldest days in June at all these places the 10th, 11th, 12th, 13th, and 14th; on the first day in the northern, on 11th and 12th in the middle, and the 13th and 14th in the more southern a southwestern regions. Frost occurred over a wide region on the 10th to t 12th, from Maine to Minnesota, as far south as northern New Jersey, Pe vania, Ohio, Indiana, and Illinois. At Haddonfield no frost appeared, tn the temperature was reduced almost to the verge of freezing, as indicated by sheltered register minimum thermometer.

It may be said, in explanation of this extreme reduction of temperature o

wide a region, that it arose from sudden and grand displacement of the upper ta of cold dry air, by the upheaval of vast masses of the lower strata, buoyant th the vapor derived from the surface; or, in other words, from the derange- and subsequent descent of the cold upper current, the result of extensive er-storms. This theory is worthy of consideration. These changes pos- y may have much modified the condition of dryness, and thus partially ex- ı the advent of extreme cold.

Again, in July, 1864, we observed a remarkably low temperature before dawn the 22d, when the self-registering thermometer stood at 50°; and again, on 23d, at 46°, at six feet above the soil—a narrow escape from frost. The low temperatures were observed from Maine over all the northern States Kansas, and southward to New Jersey and Pennsylvania. The reports do correctly express the minimum temperatures by a self-register, and the re- ion must have been several degrees lower than reported. On the morning the 22d of July there was a slight frost at Baldwinsville, Massachusetts; at Columbia, Connecticut, and Tioga, Pennsylvania.

Now, some cause acting over a wide region must be sought for to account for the widespread reduction of temperature on the days noted. Will the dimi- n of the due proportion of humidity in the air over this region adequately ain it? Will the westwardly winds, with their drying and absorbing n, prove to be the agents by which radiation is permitted more vigorously ceed, and thereby effect the changes which come over us?

us turn to our meteorological notes and observe the figures there recorded. At Haddonfield the low temperatures were observed on the 11th, 12th, and of June, 1864. On the mornings of the same days the tension of vapor out .262 to .322, which were lower measures than were observed on any mornings during the month, except on the 7th, when it sunk to 50°. On evening of the 6th the humidity had been abundant, more than twice as ant as on the evenings previous to the days above named. The tension vapor noted on the mornings of the 11th, 12th, and 13th was less than three- rters of the average for the month at 7 a. m., and but one-third of that pre- g on several occasions. On the 28th and 29th of June the self-register mometer indicated, before dawn, 50° and 51° respectively, and the amount vapor exhibited a corresponding low degree of tension, being but .389 and 406 respectively. No very low degrees of humidity were noted in July on the mornings of the 22d and 23d, when it fell to .296 and .365, which were remarkable, and were accompanied by the low temperatures of 50° and 46° respectively. The amount of vapor in the air was noticed to be but about the mean generally present, and one-third of that often observed. At 2 of the 22d but 22.8 per cent., and on the 23d but 26.6 per cent. of relative- ity were noted, numbers indicative of extreme dryness—the first ex- ıg the fact that but little more than one-fifth and the last about one- n of the vapor capable of being sustained in the air at the temperature then vailing was actually present.

Now, on the 9th of June, at 9 p. m., a northwest wind had begun to raise gentle breeze; a north wind continued all day; but it was nearly calm in the vening of the 10th. A northwest wind was blowing on the morning of the 11th, from southeast, for a short time, at noon of that day, but again north all of the 12th and part of the 13th. All day of the 9th, 10th, 11th, and 12th s of cirrus and cirro-cumulus in those heavy white separated clouds overhead or piled in the horizon, were moving first from the south and west, then from north and northwest, having been carried up beyond the ice of the surface currents or counter trades into those which were pouring and descending, to become in turn the northwest dry wind of the surface. cumulus clouds, which are produced by the elevation and subsequent action of large masses of air containing vapor, were doubtless "the visible

capitals of those invisible columns of humid air" which the absorbing northwest wind was drawing from the surface of the earth. All the circumstances favorable to the rapid drying of the air near the earth were at work, and the humidity was consequently greatly reduced. The results promised by reduction in the amount of vapor present followed, and we experienced excessive cold in accordance with the theory of Professor Tyndall. The blanket of vapor had been removed, and the heat escaped into space.

On the 22d and 23d of July the same general conditions of drying winds accompanied by extreme atmospheric dryness, were present. On the 22d afternoon of the day before the reduction of the temperature to 46°, a neighboring farmer remarked the extreme aridity of his oats, saying they "dried before they reached the ground" while cutting them. During the 22d, 23d, and 24th, the days of lowest temperature by the self-register thermometer, a smoky haze was observed, extending from Maine over New Hampshire, Vermont, Massachusetts, New York, New Jersey, Pennsylvania, Ohio, Michigan, and further west. An extended drought prevailed, the earth being as dry as the air above it, and north and northwest winds of very gentle action passed over us by day while the nights were calm. This calmness by night was also noticed early June, when the lowest temperatures were observed, and was highly favorable to radiation. On the 22d of July, at 2 p. m., the force of vapor or pressure in inches on the barometer was but .188, which is lower than we have ever observed it during summer and autumn, and lower than is sometimes noticed even at the freezing point. No abnormal reduction of temperature or of humidity appeared in August of 1864.

Here, again, it might be surmised that the reduction of temperature was due solely to the descent of the colder air of the upper atmosphere, drawn from arctic regions, were the periods of extreme cold always accompanied by northerly winds; but such is not the case at all times, though how far such north wi[illegible] may have affected the temperature of our surface currents from other quarters we cannot determine. The presence of an extreme drought extending o[illegible] many hundred miles, and the canopy of haze undisturbed for several weeks spread over all the northern States, seem to preclude the probability of the existence at the time of such descending currents from the north as would be adequate to the production of such wide-spread cold. A few local sto[illegible] o[illegible] mountain squalls may have been noted, but these did not disturb the haze, the severity of the drought indicates that no rain-storms occurred. It seem[illegible] much more probable that the west and northwest surface winds, whether from the Rocky mountains or the western deserts, were drying the surface,* and thu[illegible] indirectly cooling us, rather than that they were the direct cause of the cold. Moreover, had this cooling been due directly to the descent of the cold upper currents, the temperature at midday would have been much reduced, which was not generally the case; some of the mornings of extreme cold having been preceded and followed by high heat at midday, just as would result from the passage of the sun's rays more freely through an atmosphere deficient in a[illegible] vapor. It will also be remembered that, in general, reduction of temper[illegible] while it diminishes the capacity for humidity, tends to render that actually existing in the air proportionally greater, or to increase the relative-humidity. I[illegible] the cases we consider, the relative-humidity and the temperature decline s[illegible]taneously, or, to speak with precision, the former appears to precede the [illegible] as does a cause precede or keep pace with an effect. Whatever may be [illegible] cause, direct or indirect, of our midsummer cold, it is worthy the inves[illegible] of meteorologists, and should commend itself to American observers especially.

The experience of the writer in 1865, is confirmatory of the asserted connexion between dryness and extreme low temperatures. In June, 1865,

* See note on page 539.

ıima temperatures were not quite as extreme as in June, 1864. Very heavy s fell on several occasions, and the atmosphere was remarkably loaded with r, often to the amount of .780 to .890, at one time to .914 and .942 inch tension, as measured by the barometer. The average force of vapor for the ıth was .667, while that for June, 1864, was but .492; the lowest force of r for June, 1865, was .421, or about that of the mean for the entire month ne previous year, thus presenting a marked contrast. There were in June a few cool mornings, as that of the 12th, when, after a day of low absolute relative-humidity, the minimum before day was 53°, and the dew heavy, showing a much lower reduction under the open sky. Most of the grape-vines had bloomed, the Herbemont being then in blossom. On June 19th mildew was observed on the Isabella, Catawba, and Herbemont—the consequence of dryness and reduction of temperature.

On the 20th of June, 1865, a heavy rain fell and the air continued loaded with moisture, .816 of an inch having been observed on that day, and on the 24th, .784 inch of tension. On the 23d, the relative-humidity was remarkably low and the tension reduced to one-half of the above numbers, and the register-thermometer indicated 62½° on the morning of the 24th, and a fog was brought over from the southeast. This high humidity and sudden reduction of moisture and of temperature (for the true minimum was perhaps 10° to 14° lower) had its usual effect; for on the 25th of June the young Catawba grapes were rotting. The high temperature of the soil which, at one foot deep, stood at 76° and 77° until 9 p. m., and parted with but three or four degrees all night, may have contributed to this result.

In July, 1865, high heats and moisture alternated with reduction of vapor, and with it low night temperatures, and the grapes were again rotting. The humidity was most excessive in the earlier part of the month, when the rotting was most observed. This at one time reached the high measure of .973 inch of tension, or nearly twelve grains of vapor in the cubic foot, with a maximum temperature of 94° on the 7th. The force or tension of vapor, or absolute humidity, as it might be termed, varied from .371 to .973 inch during the month of July, the first or lowest tension having been observed on the evening preceding the morning on which the lowest temperature of 53° was noted. Though but 1.95 inch of rain fell, the relative-humidity was nearly forty per cent. greater than in July, 1864, when 3.12 inches were deposited. On the evenings of the 13th, 14th, and 15th, the low relative-humidity appeared, and the lowest temperatures of the month were observed, the register-thermometer having indicated 53½° on the morning of the 14th, and 53° on the 15th and 16th, which were very unfavorable extremes. These variations from the temperature at or after 2 p. m. to that of the next morning before dawn, were thus in several instances upwards of 26° to 30°, as expressed by the shaded and sheltered thermometers; but under the open sky, exposed to the burning sun by day, as on the 14th, and the radiation on a clear night through an excessively dry atmosphere which was present, vegetation probably endured a range of nearly or quite 100° of Fahrenheit, highly injurious as the consequences proved, for the grape crop was entirely destroyed in this section of New Jersey, as well as generally around Philadelphia.

The first half of September, 1865, appeared to be very unpropitious for the e; but our previous experience had been conclusive, mildew and rot having their worst with the native vines, and the foreign, under glass, alone d on which their destructive agency could work. From the 1st to the ɪne absolute and relative humidity were excessive, and the 14th was the most oppressive ever remembered or recorded by the writer, fre-.ıy rising to saturation. Though the heat was not in excess, the abundant ısture rendered some of the above days painful to endure, the feeling being, times, that accompanying immersion in a steam bath. Our Black Hamburg

grapes which had not already ripened under glass, were dissolved in a mass of rottenness in consequence of suffocation in this vapor-laden atmosphere.

No extreme low temperature appeared before dawn until the 16th and 17th, when, with the first appearance of reduced humidity, came also low minimum, though during the prevalence of the moisture the nights had been equally clear.*

The foregoing facts and comparisons appear to furnish strong evidence of the close connexion between diminution of humidity and reduction of temperature, and to confirm the assertion of Prof. Tyndall, that their relation is that of cause and effect—that loss of humidity continued through several days, from the action of a drying wind during a dry season, prepares for the escape of the heat of the earth by night, through unimpeded radiation, into space.

If a cause for the reduction of temperature has been found in diminution of

* As extreme variations from high mid-day heat to unseasonable cold, on the verge of frost, are evidently accompanied by, if not dependent upon, extreme atmospheric dryness, an instrument that will readily show the conditions of deficient moisture, may foretell the coming cold, and thus enable the gardener, by being forewarned, to be forearmed. The wet and dry bulb thermometer or psychrometer will often foretell, at 2 p. m. of the day before, that an extreme low temperature will probably result before dawn of the following day. The low humidity detected by the psychrometer thus often becomes a good prognosticator of frost. It is true that a change in the wind, the amount of cloudiness, &c., by increasing the proportion of vapor during the night, or bringing in warmer currents, may happily disappoint these prognostics at times. Still the gardener who daily observes the psychrometer aright, and consults the tables prepared to save calculation, or makes use of a "vapor index" (which is quite easily inspected, and dispenses with tables,) will, during the growing season, find its prognostics very valuable and may save many a tender plant.

"Lippincott's vapor index" is a very convenient card with rotating index, by which, from the observed temperatures of the wet and dry bulb thermometers, the most unskilled person may easily determine in a few seconds the actual relative-humidity or percentage of vapor in the air. It is sold at a moderate price, and may be had on application to James W. Queen & Co., opticians and dealers in philosophical instruments, 924 Chestnut street, Philadelphia.

The psychrometer and vapor index become also most valuable aids to the barometer, as foretellers of a change in the weather; indeed, it is now well ascertained that without a psychrometer the prognostics of a barometer are frequently fallacious, and that simultaneous observations of these two instruments most usefully correct each other's indications.

The rules for foretelling a change in the weather by means of the barometer and psychrometer are few and simple. Our own observations show that, as a general rule, a storm can occur only after a rise in the barometer followed by a fall, and accompanied by increased relative-humidity approaching to saturation, heavy clouding gathered from the southwest, while the surface wind is from the northeast or from the southeast. Let the changes in the barometer be what they may, if the relative-humidity be not near or at saturation, no rain can fall; and so reliable do we find these indications of the psychrometer when interpreted by the "vapor index," that we may oftentimes disregard the barometer, the other prognostics being favorable to a change. Thus one may not be at a loss for a weather-gauge with these simple instruments at hand, even though his barometer be found in the predicament of Sir William Hamilton's village hostess, who, he relates, was afraid the weather-glass was not *exactly* right, for *all* the quicksilver had run out of it.

For the economical convenience of those who cannot readily obtain psychrometers, because distant from the large cities, we may state that any two *good* thermometers, if they can be found in the country stores, and if closely alike in their range, size of bulb and bore, may be employed as a psychrometer, by covering the bulb of one of them with thin muslin, wetting this at the time of observation, and then subjecting them both to a moderate swinging until the mercury in each ceases to fall. A reference to the "vapor index" will then inform the observer how much vapor is present. All common thermometers are erroneous to the amount of one to three degrees, and should be corrected by immersion in melting ice for 32 degrees, or compared with an undoubted standard, and the tube shifted upon the index to the true degree.

The Smithsonian Institution should invite its corps of observers to add the psychrometer to their list of meteorological instruments. More extensive observations of the fall of rain and snow are also desired. The number now reporting observations made with the psychrometer is limited, and we hope our remarks on the effects of drought and the influences of humidity, excessive or deficient, will stimulate many to use the instrument by which the important phenomena referred to may be accurately determined and recorded.

The philosophy of the methods of determining the amount of vapor in the air may be seen in the Patent Office Report for 1858, article Meteorology, and should be read by all interested in this branch of the subject.

dity in the air, over any region, a remedy must be sought in protection influences causing excessive dryness. A remedy applicable to the wide rtnern territory, where these low temperatures sometimes occur during e critical periods of early spring, the direct result of the precipitate descent cold air from the high region of the atmosphere, we fear, will not be found; that in the lower regions, where the extremes are not so great and where ey merely border on the freezing temperature, perhaps they may be applied ith considerable promise of success.

Now, let us ask ourselves what are the causes operating around or above us, ducing excessive dryness in our atmosphere and in the soil? A west or orthwest wind is undoubtedly a cause, largely, if not wholly, competent to re- the amount of vapor in the air, and to render it incapable of preventing the pe of heat absolved by the earth during the day. We know that the winds nich are flowing towards the northeast from the regions of the tropics, part ith their moisture in rains and showers over the temperate districts. We know on the Pacific coast the prevalence of westerly winds gives a great uni- y to the temperature, and that most of the rains come from that quarter; the cloud-bearing winds, by passing up the slopes of the Rocky mountains, e t ir moisture by condensation into clouds and deposition as rain and snow, they pass eastward they are dry winds, and must so continue over aesert region, arid and waste, which extends from the mountains on to the borders of the Mississippi valley on the east. These conclusions so well established, that it has been well remarked of the northern Atlantic says Robert Russell, "So long as the westerly winds continue to blow in , there is no cessation of your cold; and so long as they continue to blow broad, regular stream in summer, there is no end to your drought." (Smith- Report, 1854.)

A great drying agent may then be generally found in the westerly wind,* mes in that from the northwest. The only protection from their baleful luences appears to be ample and systematic planting of dense evergreen trees n the west and northwest sides of orchards, vineyards, and gardens gen- lly. The northeast also should be sheltered. We have been reckless in sing the gift of Providence to our fathers. We have razed with ruthless hand e forests which were both the ornament of our region and the safeguard from ravages of cold. The truest wisdom may be learned in the school of nature, it only as man imitates the plans of the Creator that he can hope to r.

As mitigators of the severity of radiation, the introduction of shelter trellises highly promising. But in more northern districts, where this method may ot be available, it were better to abandon all attempts to cultivate our tender uits, except in regions where the severity of dryness and of cold in midsum- ameliorated by the presence of widely protecting waters. It is only in sheltered regions that we can now hope to find a climate fitted to the reg- production of our leading varieties of fruits, and it is here only that we shall able to meet with success in grape culture through a lengthened series of rs. As respects the value of forest screens, a large body of testimony might advanced; a few illustrations will suffice.

VALUE OF SCATTERING BELTS OF FOREST TREES AS PROTECTORS FROM DRYING WINDS AND EQUALIZERS OF TEMPERATURE.

The decline of many varieties of fruits once successfully grown and highly teemed, has often been ascribed to the exhaustion of the elements in the soil cessary to healthy growth and fruiting; but we apprehend that this deteriora-

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* See note on page 539.

tion is much more largely due to the distribution of our forests—to the removal of those protecting screens which once sheltered, not only from extremes of cold, but also from extremes of dryness.

It is a common experience that our best varieties of fruit trees are more liable to disease, and that their fruit is generally inferior in quantity and quality to that known to our fathers. Negligent culture and increased age of the trees, it is true, may have had some influence; but even more skilful culture applied to young and thrifty trees is not attended by the success formerly common. Our apples are more frequently scabbed and distorted; our pears so knotty, cracked, and hard, that we need not seek Australian pears (which are said to be of wood) for distortions or perversions of this fruit.

Though the practice of gardeners in Europe may not be generally applicable in America, and those who expatriate themselves to settle among us soon part with many of their home-bred customs, it were well if one of the universal rules of English gardening still held sway among us. An English garden is seldom seen without a wall or hedge surrounding it, and their fruit grounds are also generally protected in the same way. We have been under the impression that their walls are necessary in order to produce, by reflection, a higher heat for ripening the peach and the apricot, which they doubtless do cause to mature more perfectly; but any one who reads their best horticultural treatises will find that they are also intended as shelter from what are deemed blasting winds. Hear an old authority, the learned and pious John Lawrence, author of the once very popular "Gentleman's Recreations," a work now one hundred and fifty years old, but still sound and valuable: "One great cause of the want of fruit in many gardens is a lying too much open and exposed to the winds, especially the west and southwest winds, which, in many parts of the year, make terrible havoc and desolation in our island, not only by blasting the fruit in the spring, but by chilling and starving the fruit all the summer, so as to hinder it coming to any due maturity." If such are the consequences of the west and southwest winds, which are comparatively mild in England, what would we reasonably expect should result from the free range over our orchards of our westerly and northerly winds, and the raw damp northeasters of our northern States? Can we continue to feel any doubt that in this free exposure to such winds, now more than ever before free to blow where they list, we are generally so unsuccessful in our attempts to grow good and fair fruit in the open country?

As if to offer the fullest confirmation to the truth of the assumption that shelter is the *sine qua non* in fruit culture, we have the experience of our city friends, who, in horticultural efforts, always surpass us in the country, whether we regard quantity, quality, or beauty of the product. Any one familiar with the exhibitions of the Pennsylvania Horticultural Society knows that Isabellas and Catawbas grown in the city of Philadelphia surpass those grown in the country. Every one knows that a venerable amateur, Isaac Baxter, on a city lot surrounded by brick and mortar, has, for a long series of years, grown such butter pears as no resident of the country around has been able to exhibit. Let any one visit the rooms of the Mercantile Library in Philadelphia, and look upon a fine old butter pear tree standing in the back yard of the Dispensary, sheltered by walls on the northwest, north, and northeast, and note in the season the fruitage—smooth, golden, and tempting—and believe, if he can, that such pears cannot still be grown as of old under favorable circumstances, sheltered from drying winds and cold. The vine and the pear, especially, require a climate moist and warm; and shelter from drying and cooling winds, with proper southern exposure, are the prerequisites for supplying these conditions. It is to the protection from the northwest and northeast winds, with perhaps some elevation of temperature due to reflection, and the generally increased warmth of the city, that we must ascribe the success of our city amateur pomologists.

An amateur gardener in the city of Camden, New Jersey, whose grounds are

ıded by a board fence, and who is, at the same time, affected by the pro- influences flung around it by the damp atmosphere of the Delaware, (but ıdred yards distant,) produced pears upon his dwarf trees greatly exceed- raised by his neighbors further removed from the river shore. Smooth ıxen fruits grow upon his trees, while theirs are knotty, gnarled, and ss, because exposed to the pelting northeast, or the biting and drying est, with its keen and eager airs.

listinguished meteorologist, Frederick Daniels, by whom the first regular urate observations on the dryness and moisture of the air were made. that excessive exhalation is very injurious to many of the processes of on, and that no small proportion of what is commonly called *blight* may buted to this alone—that evaporation is increased in a prodigiously rapid th the velocity of the wind, and that anything which retards its motion efficacious in diminishing these exhalations from the leaves of plants eover adds, that in seasons of extreme dryness tender fruits are much ıble to injury, and that artificial shelters by means of walls, palings, or evergreen screens that will break the force of the blasts, are the most us methods of preventing the evils of excessive drying.

ıe foregoing illustrations of the great value of the kind of protection sug- nay be appended evidence of the great injury resulting from the removal shelters originally planted in our forest land. A few of this character fice, but a heavy mass of evidence could be adduced, all expressing the eat truth. Man is rashly destroying the great regulators of the climate, his ignorance or indifference he is making no compensation therefor, by duous replanting of trees.

e Ohio Pomological Society's report for 1864 appeared the following ıt remarks by Dr. Peticolas, a devoted pomologist, of Mount Carmel, ow deceased. He stated that "out of one hundred and twenty or one l and thirty varieties of apple trees in bearing, it is difficult to select six f good merchantable winter apples, because the product is not perfect, ıt may be abundant. This imperfection is caused by the never-failing or scab to which our apples are subject. Although some seasons are e as bad as others, still one-half or more, as a general rule, are unfit for and it is really humiliating to think that we who, a few years ago of the superiority of our fruit as compared with that of our eastern (of western New York,) should now be obliged to acknowledge that pass us. Now, why is this? Why should such a change have taken No such alteration, that I am aware of, has taken place in the east; their ıre as fair and as good now as they were twenty or thirty years ago our varieties are less prolific than they were fifteen years ago. Rambos re, at seven years old, ten bushels of good fruit, but since have never ver four our five, even in the most favorable seasons, and these but infe- t. Redstreaks, the same time and age, bore thirteen bushels, but have any season since borne more than three or four of comparatively poor Nor can this change be attributed to the age of the tree, for trees of ll ages, of the same varieties, were nearly as unproductive. The white ır was formerly one of the finest and best apples, but can no longer be as the same, being now so knotty and scabby, and producing but one- f its former yield. The White Pearmain was another of the best keeping st dessert apples, but it no longer is even fit to look at, being perfectly d with the scab. Most of the others were in the same condition." Our ist, so desponding, does not consider it of much import to point out the this evil, because he is satisfied, from long observation, that it is entirely o variations in temperature, and believes it therefore entirely beyond rol. Herein we deem him somewhat mistaken. He asks the question, hould our climate have become so different from what it was formerly?"

and then cites his observations as follows: His vines when grown on a suffered badly from rotting after bearing a few years, but where the vi grown sufficiently, and had reached the side of the house to which th tacked, the fruit was fine and as sound as possible. This result he asc the heat absorbed by the house during the day, and given out by condu radiation at night, thereby equalizing the measure of temperature.

Every one who has a vineyard, he further remarks, must have obser the mildew and rot supervene after some sudden change in the temperatu ticularly when accompanied by rain. Now, the same effect takes pla apples and other fruits. Prince's Harvest was formerly one of our b earliest apples for market, but the doctor had ten trees from which he picked ten perfect specimens in ten years, although they bore quite abu the fruit being especially affected by mildew and cracked badly. induced him to observe this variety very closely for the last five or si and he discovered that spots of mildew invariably formed on the you immediately after a cold night, when the thermometer had indicated a of 20 to 30 degrees.

This growth of mildew takes place when the apples are of various si the earliest formation to that of hickory nuts. These fungus growths as dark-colored spots, which arrest the growth of the apple immediately causing it to become distorted, while the expansion and contraction diseased action, which results in the cracking and general scabbines fruit.

Dr. Peticolas well remarks that no change has taken place in the cl western New York, where apples are as fair and as good as they were or thirty years ago—failing to perceive that the injury to the apples has arisen from the changes man has wrought upon the country by in nate felling of the forests. He did not perceive that the climate of west York was preserved uniform in its measures of atmospheric humidity, tected in a great degree from those extremes of which he complains, an are not only extremes of cold, but also extremes of dryness, quite as able.

While conducting an extensive correspondence during the past winte purpose of gaining information respecting the character of the climate o gan, and learning the opinions and experience of both scientific and men, it was interesting to perceive the perfect accordance in which th respecting the effects of the removal of the forests. Says Dr. Kedzi Arigricultural College, Lansing,: "The meteorological changes wrough destruction of the forests in Michigan are well marked. From 1828 the peach crop in Lenawee county was as reliable as any fruit crop. needed no protection and received but little care, and usually bore an e crop, followed by two years of smaller product, thus being abundant ev year. Now, in 1865, this fruit is only raised in situations protected manner from southwest winds, and the experience for fourteen years the same as at present. In 1852, and prior thereto, peaches were g Eaton county, near the centre of Michigan, in abundance, however exp present they are a rarity except in guarded places. Thirty years ag that would injure the corn in the spring, or during the usual growing from May to October, was almost unknown; at present it is an element into the calculations of every prudent farmer, so frequently do such fros The aspects of the district above referred to have been changed by th man's axe, and with the last forest-clearing the peach has failed, until at no reliance can be placed upon it except near Lake Michigan."

Says T. T. Lyon, of Plymouth, Michigan, one of the most exp pomologists of the State: "The peach crop during the last fourteen y

led four years out of five from winter-killing of the fruit buds, and, occasion-y of the trees, although previously it was reasonably certain."

above testimony is confirmed throughout the West, and we are happy to ive that the pomologists of Illinois are agitating the subject of tree plant-g on their extensive natural prairies. To the citizens of that great State anting is a subject of vast significance. A writer in the Prairie Farmer, se enthusiastic spirit is worthy of all praise, exclaims: "Who can compute amount of winter grain, of fruit, of tender shrubs, destroyed by the intensely sweeping blasts which rave over the prairies of Illinois? The question s home to all the residents of such districts: Can nothing be done to soften rigor of such sweeping storms? Yes; stud these prairies with belts and roves, with screens of evergreen and deciduous trees. Plant the railroads and ways with rapidly-growing trees, in double or treble rows, upon the sides which drifting snows accumulate, and carefully attend to them after plant- The money spent in clearing, and keeping clear, the tracks during a heavy upon one of the western railroads, would have purchased trees or cut-sufficient to have planted the entire line of road, which, in four or five , would have grown to a perfect barrier against accumulating snow-drifts. enefit arising from planting trees would not stop with the saving of money corporations, and with the saving of life and suffering to the people. The would be increased in certainty and amount, the health-giving fruits d to us, domestic animals made comfortable and thrifty, and the surface the country would become beautiful beyond conception. Do not forget the n the extreme storms of cold should teach us. Let tree-planting go on eforth with renewed earnestness and care, and anon we may laugh at the ts, and point with pride to the wonderful transformation the human hand ccomplished."*

It is the prevailing opinion that forest protection is more demanded during inter and early spring, but the experience of many pomologists points to its fluence in early summer as quite as valuable. The destructive blighting hich results from rapid drying by the absorbing currents of westerly winds uring seasons of low, relative humidity, and consequent sudden increase of ld, has already been dwelt upon. The experience of Dr. Peticolas is con-tory of the necessity for shelter during the fruit-forming season, and is in ony with that of pomologists in the East, and we are convinced that belts rees in an open country are absolutely necessary for protection from sum-er extremes of dryness and of cold. In our own district our winters are gen-ly mild, and we need but little shelter from northern winds; but after the le set its fruit it is generally cut off or mildewed by raw northeast n orchards open to their range; but where protected therefrom a crop is more assured.

Says General J. T. Worthington, of Chillicothe, Ohio, in the Ohio Pomo-al Society's report, 1864: "I become every year more convinced of the ty of belts of trees in our climate of extremes to protect the annual s from the late frosts and the fervid suns of July, August, and September; I verily believe that if one-third of the land were devoted to belts of fruit other valuable trees, the remaining two-thirds would produce as much as whole without such shelter, even in average years, and far more in extreme

* A correspondent in northern Illinois writes: "I am situated on high open prairie nine hundred feet above tide-water, and about six miles from woods or timber on the south, and east, while on the southwest and west is a prairie open to the Mississippi, undred miles distant. Our winds have free course, disturbed by no local influence, but go it with a rush. The force of the winds is rarely reduced to 0 or calm, but is fre-ly 5 to 6, at times 7 to 8, of the Smithsonian scale, which indicate a high wind to a , and even a violent gale. These winds from the southwest are often dry, and are some-s so arid that in their sweep over the soil vegetation is withered before them as if at the h of fire."

ones; but I fear it is too early to preach planting trees to a generation which considers it 'the chief end of man' to destroy them." There appears to be no room to doubt that greater dryness of the air is a result of the removal of the forests, and that the earth then ceases to be equally moist, or the springs to furnish an equal quantity of water. It is the experience of ages in various countries that the presence of forests really makes the climate comparatively wet, and their removal makes it dry. It is not conceivable that they do this by absorbing vapor from the atmosphere, converting it into water, conveying it to their roots, and thus furnishing a supply to the ground; for this would make the atmosphere drier, and it is known that it is made more moist by their presence. If forests do cause the climate to become more moist and springs to flow more abundantly, as is generally declared, it can only be by causing more rain to fall. The progressive diminution of rain in the south of Europe is ascribed to the destruction of the mountain woods; and the diminished supply of water to ponds in our immediate district is known to be closely connected with the removal of our trees. It is curious, however, to observe that, in the latter instance, extensive under-draining has, in a great measure, restored the supply driven from springs; undue evaporation having been thus checked by facilitating the descent and gradual withdrawal of water from below. The under-drainage was, of course, chiefly applied to lands formerly marshy, or holding water near the surface. When lands are very widely cleared, extensive under-draining may prove injurious. Already the want of calculation and of fore-thought on the part of many improvers of land has been shown by their ill-judged extension of drainage. The rain falls on the land, and in a few hours it is removed from the soil and carried off by the brooks and rivers to the sea; consequently when a season of dry weather supervenes, the farmer finds his crop perish for want of water. In England, where these results have appeared, irrigation has, all at once, become the question of the hour, and the subject is being pressed upon the consideration of agriculturists.—*Journal of Science, January*, 1866.

The action of forests in adding to the rain-fall, appears to be due to their offering an obstruction to the free flow of currents loaded with vapor, and the upward tendency such obstructions give to the air, by which it is piled up and retarded until accumulated at sufficiently high elevations to induce condensation into clouds and rain. This is one of the regular effects of mountain ridges, and any cause which shall, in like manner, force the air to rise in any particular locality may produce a similar result. The friction against the surface of the level earth impedes the free motion of air or winds, and that which follows tends to pile up upon the back of that resting on the earth, and that behind to climb still higher. If, then, the impediment of a dense forest be added to the obstruction already existing to free motion, the ascent of the strata of air will increase according to the force of the wind bearing vapor with it. When this storm encounters a forest, the resistance must be materially augmented, and the retardation of the strata becomes greater, the overlapping and ascent of the current increased, more abundant condensation takes place, and more rain falls, and the district thus becomes more wet than it would have been had the bare ground alone been left to retard the progress of the lower portions of the wind. Forests, therefore, cause the surface currents to rise higher upon their sides, as up an inclined plane, and to attain a great height, thereby affecting a district as would mountains of moderate elevation.—*Hopkins's Meteorological Essays.*

While we write, it is announced in the daily papers that the inhabitants of the Cape Verde islands are again in distress from famine through lack of rain. Having destroyed their forests they suffer terribly from periodical droughts. From 1830 to 1833 no rain is said to have fallen, and 30,000 people perished, or more than one-third of the population. Though it has been proposed to re-

ant the forests, such is the ignorance and indolence of the people that little as been done towards restoration.—*Philadelphia Inquirer, May* 17, 1866.

Many well attested instances of local change of climate might be cited, most f which are to be referred to the influence of forests as a shelter against cold inds. To supply the extraordinary demand for Italian iron, occasioned by e exclusion of English iron in the time of Napoleon I, the furnaces of the ys of Berganio were stimulated to great activity. "The ordinary production charcoal not sufficing to feed the furnaces and the forges, the woods were , the copses cut before their time, and the whole economy of the forest leranged. At Piazzatorre there was such a devastation of the woods, and ıtly such an increased severity of climate, that maize no longer ripened. ociation, formed for the purpose, effected the restoration of the forests, na flourishes again in the fields of Piazzatorre."

ameliorations have been produced by plantations in Belgium, and a dis- reaeemed from sterility by simply planting regular rows of trees, the oldest t which is not forty years of age. While the tempest is violently agitating their ps, the air a little below is still, and sands the most barren have, under their tection, been transformed into fertile fields. For many illustrations of the e of forest shelters, as well as proofs of the destructive activity of man, see very valuable and instructive work, "Man and Nature; or, Physical graphy as modified by Human Action," by Geo. P. Marsh; published by . Scribner, New York, 1864.

Our fathers were, perhaps, wise in their generation when they so vigorously d against the right of the King to mark the best trees in the New World mn nis broad arrow, and reserve them for royal use; but it would have been rell for them had they early enacted stringent laws against indiscriminate de- tion of forests.

A terrible scourge, and often exercised, was the assumed right, the worst con- s and tyrants of old usurped, of destroying the forests of the prostrate . Even among the ancient Greeks, barbarous as was their code of war, all war is barbarous,) it was considered an unpardonable offence to cut down olive trees in an enemy's country, and the single word *dendrotomein*, the er of trees, conveyed, in their apprehension, the idea of the most barbarous of devastation.* Are we less wise, less regardful of our own interests and t mose of our children—we, who boast ourselves "the most enlightened"—han were the semi-barbarous Greeks, of the interest of their enemies? Are we devastating the fair face of our country, not, it is true, by destroying our rnit trees directly, but as surely, though indirectly, by our ravages among the st shelters of our great inheritance, while we remorselessly consume the erial for the fires, the machinery and dwellings of our children's children? s it not high time that we had a Commissioner of Woods and Forests, and en- ctments regulating felling and planting, and enclosing them? We act as if our orests were inexhaustible; let us take warning by the experience of Europeans, who once thought as we now do, but were obliged, too late, to enact laws to reserve their timber and save a wreck from further destruction. In some parts f Germany no farmer is permitted to fell a tree without showing that he has lanted another; and it is an inviolate custom in some German districts that man must produce a certificate that he has set a certain number of walnut rees before he is permitted to marry. Wise precautions against the day of alamity, which the entire removal of the trees would surely bring upon them. We are blindly following our instincts as to what may conduce to our personal present advantage, regardless of the wide-spread evils that will assuredly ow from changes brought about by our individual labors of destruction. Let lso bear in mind that we are but tenants of this earth, not owners in per-

*Also, Isaiah, xiv, 8.

pertuity, and have no moral right to injure the inheritance of those who succeed us; but it is our duty to leave this world better than we found it. Not to desire to do this, is unchristian—is barbarous. Plant, then, trees; teach your children to plant trees and to love them. Again, I say, plant trees, and if you can find no other time to plant trees, arise at midnight and plant them.

ON HORIZONTAL SHELTER AS A PROTECTION FROM THE VINE MILDEW.

Among the remedies which have been proposed, whereby we may avoid the injurious effects of excessive radiation on dry nights, there are two which appear worthy of trial on an extended scale, as they have proved of much value when applied to a limited extent.

Every person who has trained vines on his out-houses has noticed, in seasons when they have suffered from mildew, that the branches which were sheltered by a projecting coping or eave were almost invariably free from injury; and that the grapes were ripened under this shelter, while shrivelled or decayed on the rest of the vine. Such has been the result of our observations, both at home and abroad, and furnishes renewed evidence that mildew and blight are generally, if not always, induced by extreme radiation at night.

The first proposed remedy we will notice is not new or untried, but can be traced back nearly one hundred and fifty years. In that excellent practical work, "The Fruit Garden Kalender," by John Lawrence, M. A., London, 1718, will be found the following: "The great misfortune which we, in this island, suffer with respect to our late fruit, is the unconstancy of the weather, and the great difference of ten times betwixt our nights and days, as to heat and cold; for we do not seem so much to want hotter days as less cold at nights." * * * Referring to "the perpendicular frosts and mists which fall so frequently in spring and autumn, and cause such fatal destruction," he says: "But were it any way practicable, nothing could more effectually bring Italy into England than a contrivance to take off the influence of our cold nights and uncertain weather. This I am persuaded might, in good measure, be done with no great charge or trouble, by means of low ordinary espaliers (trellises,) about two feet high, along the several rows of vines, to which their shoots might be carried horizontally and fastened, and the fruit itself likewise defended by horizontal shelter fixed on the top of the espaliers, made of coarse narrow planks, with a convex superfices to throw off the wet." Again, in the "Gentleman's Recreation," by the same author, he remarks, "Now these hints proceeded, I think, upon a right supposition that most of our frosts and blasts, both in spring and summer, fall perpendicularly, * * * and therefore the more anything lies open and exposed to this perpendicular descent of vapors, the more will it be subject to be frozen, or, which is the same thing, blasted; the truth of which is confirmed to us both by reason and experience. This, therefore, being the true state of the case with respect to most of our destructive blasts, a little philosophy will teach us that horizontal shelters are the best guard and defence against perpendicular frosts." The above was written nearly a century before the phenomena attending the formation of dew and frost were comprehended, and nearly a century and a half before the true theory of nocturnal radiation was announced by Professor Tyndall; yet the facts recorded and the reasoning employed harmonize completely with the doctrine of the latter philosopher.

Our ancient amateur gardener does not limit himself to horizontal shelters, as above described, extending along the top of a low trellis; but recommends a succession of short projecting tiles from a wall, or boards from a trellis, one above the other, a foot or more apart, with openings between them through which the arms and stronger branches of the vines may pass upwards; while under each of these short boards the shorter branches and fruit may be protected from the "perpendicular frosts," or, as we would now express it, from direct radiation to-

rds an unclouded sky, and through an atmosphere deprived of its heat-ab-bing and sheltering vapor. The experience of the projector of this ingeni- plan of protecting vines and wall fruit he records as "highly satisfactory, ecially as respects peaches, figs and grapes, which in many cold summers, hout such helps, would never be ripe at all;" and "that horizontal shelters do lly accelerate the ripening of fruit has been confirmed by experience."

As it is now understood that the state of the atmosphere is the predisposing of the check to vegetation, which prepares for the access of mildew, and is it is to deficient humidity both in the air around the vine and in the super-al stratum, whereby an excessive radiation of heat by night is encouraged, it uld appear highly probable that the mode of protection suggested and ap-ed by Mr. Lawrence one hundred and fifty years ago, in England, would be d adapted to our own needs. Nor has it been entirely overlooked. The rience of William Saunders, the excellent superintendent of the Propagat-; Garden at Washington, has recommended a protecting grape trellis, which has prototype in the horizontal shelters of the English gardener. That these pro-tors have proven valuable, is shown by the testimony of E. W. Herendeen, Macedon, New York, who visited the "experimental garden" at Washington 1865, (a highly unfavorable season for vines,) and in the Country Gentle-, January 25, 1866, asserts that they answer the purpose perfectly. The r in this case was simply a board sixteen inches wide nailed to the top of the . In the Prairie Farmer for December 24, 1864, T. K. Phœnix writes: t is a fact worthy of note that those vines under our covered trellis never had dewed leaf and had ripened their wood hard and fine, while exposed vines went. So much in favor of protection, and such simple protection too!"

Finally, William Saunders, to whom we are indebted for the revival of this d, adds: "I have nearly one hundred varieties of grapes under the shelter is, as figured and described in the Agricultural Report for 1861, and *none* so red showed *any* signs of mildew, although we lost very heavily on those protected last summer," (1864.) For a description and illustration of Saun-s's shelter trellis, see Patent Office Agricultural Report for 1861, pp. 497, 498.

Another method, which has effectually prevented the appearance of mildew, enabling the vine to withstand the effects of excessive radiation by night, is permit the vine to trail upon the ground. We have seen very fine crops of ncords at Hammonton, New Jersey, grown without a trellis or stake, but lying on the ground, the fruit resting upon strips of cedar bark. These grapes were rly all perfect, and received a premium as the best grapes in the New York rket. Another grower in the same county of Atlantic, New Jersey, trained hundred Concord vines on frames near the ground, so that the surface was ted from the sunshine by the foliage. No "rot" appeared on his vines treated, while in the immediate vicinity Concord vines tied to stakes suf-ed severely from "rot." Again: the most careful cultivators at Hammonds-t, Steuben county, New York, train their vines upon the low trellis in such nner that the bunches of grapes will be near to the soil, and receive the rmth radiated from the surface; thereby insuring early maturity, a richer vor, more abundant saccharine, and higher aroma, than if grown at a greater nce from the ground. Thus grapes on branches hanging within a foot of l have been found fully ripe and rich in bouquet, while those three feet r were still unripe and extremely acid. This method of training, com-ed with Lawrence's shelters, but four feet from the soil, would seem to leave le to desire as requisite to safety of the leaf in summer, and perfect matura-n of the grape.

As there are many localities where, from the nature of the soil, the grapes uld be injured by close proximity to the earth, we would suggest that a with uprights so hinged to their foundation posts as to permit their sion in sections towards, or almost in contact with, the surface of the

ground, might prove valuable. On occasions when a cold night is prognosticated by the psychrometer, by laying this trellis and its attached vines nearly horizontal, we could place them in a stratum of the atmosphere the warmest, the most humid, and, consequently, the least exposed to the evils of excessive radiation, which the overlapping leaves would in some measure also arrest. At other times when, by day, a rapidly drying circulation of air may be deemed necessary, or during a damp period, the trellis and its vines could be raised and fastened vertically, as desired. It is highly probable that, by combining the low horizontal trellis, properly sheltered, with the hinged posts depressible at will, we could avoid much of the injury we now suffer from both mildew and "rot."

ON THE ROT OF THE GRAPE AND REMEDIES THEREFOR.

The introduction of many new varieties of vines, supposed to promise better than the old, and render grape-growing generally profitable, has brought into the horticultural ranks many intelligent and educated amateurs. The keen interest with which these scrutinize, study and reason, respecting pomological practices and phenomena, while untrammelled by venerable routine, is refreshing, and cannot fail to upset many old notions and to develop many truths hitherto overlooked.

Among the errors which a sound philosophy will dissipate may be named the following, with the reasons assigned for believing them erroneous, deduced from the physiology of the vine as taught by the botanists, but disregarded by the vigneron. The more important practical errors are deep trenching, high manuring with animal and vegetable matters, planting in heavy, undrained clays,* an impervious sub-soil on low grounds with defective drainage in general, close pruning, and heavy cropping. The reason for believing the above practices hurtful are, that deep trenching causes the roots to run deep, and high manuring induces a rampant growth of wood and root; the heavy clays do not permit a ready passage of rain and air, and an impervious sub-soil retains the heavy rains around their abundant roots with their multitudes of feeders and moisture imbibers. The superabundant water from heavy rains being generally followed in early summer, by excessive atmospheric heat and very high temperatures in some soils, which is retained during the night, the vine is stimulated to vigorous action, and draws up from the saturated earth more moisture than it can evaporate through the sparse foliage which close pruning has permitted to develop. An engorgement of the tissues of the leaf and young fruit is the consequence, and rupture and death of the fruit, known as the "rot" and blight of the leaf, which prepares for the fungous growth known as "mildew."

Added to the above causes of decay of the vine may be cited the practice of taking from it, occasionally, (or it may be successive,) heavy crops in favorable years. From two to three times as much fruit is retained as the vines should be permitted to carry, which excess so impoverishes and weakens the plant as to render it incapable of resisting any of the causes of injury to which it is exposed, even when but of moderate amount. Vines which, in many instances, might have continued moderately productive, are thus destroyed, and a continued demand sustained for "new varieties which will not rot nor mildew" to take their places, to receive the same treatment and to meet the same fate.

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* Heavy clays where the surface drainage is good and the surrounding climatic conditions eminently favorable, may prove more productive of fruit of superior excellence and less susceptible to mildew than some sandy loams abounding in vegetable matter and partially underdrained. This may arise from the more ready absorption of water and the higher heat attained by the latter soil in early summer, when the heaviest rain-fall is often followed by very high temperatures which force the vines into excessive action; while the clay soil with good surface drainage, will neither absorb water so rapidly nor become so quickly heated by day, nor so readily cooled by night. The mildew observed on the shores of Lake Erie appeared on land abounding in sand and vegetable matter.

A cultivator of many years' experience near the Hudson river, New York, rs, that after having qualified himself, as he thought, for the business of grape-owing, it required four or five years to bring his Isabellas into bearing con- and five years more to unlearn what he had learned. Having almost vines by pursuing the close-pruning system and summer trimming, as led by gardeners whose knowledge had been derived from experience plant-propagating house, he was obliged to reform his method, and now ues that so successful in the hands of Dr. Underhill, of Croton Point vine-ds. The same grape-grower adds, that excessive bearing is a great error, a that the worst cultivator always obtains the largest crops while his vines it, and that a small uniform crop every year is indicative of good cultivation, d recommends that but five or six pounds of fruit be permitted to mature on ch Isabella vine occupying a space of eight by ten feet.

In the New York semi-weekly Tribune, August 30, and October 17, 1865, recorded the experience of E. G. Johnson, of Peoria, Illinois, which is perti-nt. He says that in the black prairie soil, on clayey sub-soil, "rot and mil-" prevail, and that vines thoroughly pruned and tied to stakes rotted badly, those which were unpruned on high trellises escaped. An amateur, resi-near, always lost his Catawbas when he cut his vines; but having stopped pping" them for some years past, has had no "rot" since. Finally, that had found six cases of Catawba vines in his vicinity where the grapes did ot, nor the vines mildew; and that in each case the vines had not been cut pruned, and that he knew of no case where pruned vines did not rot or ildew.

Dr. Warder says that the Catawbas around Cincinnati "have so degenerated this year (1865) the vines are nearly barren." To what cause can this ribed, save neglect of the natural conditions of equilibrium between the s and leaves, enfeebling of the plant from year to year, by rushing the juices fruit, instead of dividing them in due proportion to the demands of the plant a fair crop, with occasional severe ordeals of high atmospheric humidity on ngenial soil, and alternating extremes of dryness during the growing season, ich their enfeebled condition cannot endure?

We must learn from nature, "the kindest mother of us all," if we would learn t. The vine, we all know, is a climbing plant, destined to rise by help of r trees, and to grow in their partial shade, sheltered from the hot noonday and protected from the extremest cold by night. We cannot change its re, but must adapt our culture to its imperative necessities. How can we onably expect it to thrive through many seasons where it is deprived of elter around or above, clipped into rigid stocks, and thwarted in every direc-in which its instincts prompt it to extend, enfeebled and rendered the easy to atmospheric changes in every district not provided by nature with coun-aili advantages?

A r dy for the prevention of the "rot," where vines are already planted in nched, highly manured, tenacious, and retentive soils, has been proposed, ic ears to be philosophical and highly promising. It is that of Dr. Schröder, e enthusiastic vineyardist, of Bloomington, Illinois. He remarks, as is gen-ally observed, that the first crop of Catawbas is not injured by the rot, and fore proposes that the vineyard shall be frequently renewed by layering, e new vine thus formed shall have borne its first large crop, or the third n year after planting. Long canes should be grown for layering and d on t soil, extending to mid-way between the rows. By continuing this suc rely from each new vine for four years, and extending the layers ny, t last plant may be brought in position to take the place of the pa , and a vineyard of young vines be constantly maintained, which, s c a, are always vigorous, free from disease, and produce superior fruit. Tl method, which appears well worthy of trial, certainly does away with

the evil of extraordinary root extension and unnatural diminution of leaves, (or the evaporating organs,) by excessive pruning. We know that in the vine, as in other plants, the growth of the root and its branches keeps pace with the extension of the stem. As the latter shoots upwards and expands its leaves, the former grow outward, absorbing moisture to supply the evaporation into the air. The older the vines the greater must the root expansion have become, and the more numerous the rootlets occupied in absorption; but the annual pruning at one fell stroke destroys the equilibrium which nature had endeavored to establish, and the leaves and fruit of the aged pruned vine are rendered liable to engorgement and suffocation with excess of moisture or of sap.

GENERAL REMARKS ON MILDEW.

Frequent reference has been made to mildew, and some explanation of the meaning of the term and notice of our present knowledge of this evil may be here in place.

Fungi are an extensive family of cryptogamous plants, generally known as mushrooms, toad-stools, rust, smut, mould, mildews, etc. They are generally parasitic, or grow upon and derive their nourishment either entirely or in part from the substances they infest. They are found wherever there is decaying vegetation upon which to feed, and sometimes prey upon living tissues. Nothing of vegetable origin is free from their ravages, when exposed to influences favorable to their growth. They are found also on animal dejections, on insects, whose death they cause, on the human skin, and even on bare stones, on iron but a few hours removed from the forge, and on acid chemical solutions. Our house-flies are often destroyed by a mould which, growing between the segments of their bodies, produces the white rings thereon, as many may have seen. Some cutaneous disorders are the result of the operations of these vegetable parasites. *Oïdium albicans* forms the disease called *apthæ* on the mucous membrane on the tongues of infants, penetrating so deeply as to be irremovable by art. It is found also in the nose, the wind-pipe, stomach and intestines.* Fungi are an attendant of diphtheria, and are present in cholera vomitus as well as in yellow fever. Other parasites not much dissimilar abound in the scalp, causing diseases, others on the teeth, some on the respiratory organs of birds, in their brains and eggs, and they have even been observed in the midst of the human eye. Fish are often covered with them; the silk-worm has been destroyed by the *Botrytis bassianæ*, and the "potato-rot" is now ascribed to the *Botrytis infestans*, both forms of fungous growth.

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* Dr. Laycock and others regard diphtheria as due to the *Oïdium albicans* whose sporules and mycelium have been found on the mucous membrane of the mouth, fauces, etc. Diphtheria is most common in the foul districts of France and England, and is attributed to the action of putrid effluvia on the fauces, especially the foul air of sewers and cesspools, which offer highly favorable conditions for the propagation of fungi. Vitray and Desmartis are of opinion that there is no distinction between the *Oïdium albicans* and *Oïdium Tuckeri*, the former causing the diphtheria, the latter the European vine mildew. A connexion between the appearance of the European vine-mildew and the various forms of epidemic laryngeal maladies has been observed, which strengthens this presumption, the spread of the former having been followed by that of the latter.

Rev. Mr. Berkeley, one of the highest authorities on fungi, says that the mould so extremely common in England on pears, apples, and other fruits in autumn, and frequently, while yet hanging on the tree, is the *Oïdium fructigenum*, which is another species of the genus to which that causing diphtheria belongs. He also asserts that the Isabella has never suffered from the mildew when grown in Europe, though the *Oïdium Tuckeri* destroyed the European vines generally, from England to Madeira.

Many of these conclusions we believe to be unwarranted assumptions, so much remains to be learned respecting the classification of fungi. The vine-mildew of our native vines is not the *Oïdium Tuckeri*, and even this is now shown to be but a barren form of another genus, known as *Erysiphe*.

Prof. J. H. Salisbury has shown that the cause of "fever and ague" is no r involved in mystery. He has not only detected, figured and described minute accuracy the species of fungus which produces this disease but s propagated and cultivated the plant within doors to an extent sufficient to inate the atmosphere of the apartment and induce attacks of fever among .tes. His labors also demonstrate that measles are of cryptogamous or us growth. (See *Ohio Agricultural Report*, for 1863, and *American al of Medical Sciences, January*, 1866.) These microscopic vegetable wths are probably also the predisposing cause of variola and small-pox, of cholera and the rinderpest, and of the plague of olden time.* Their dwell- ce is as universal as their growth is simple; the air we breathe contains and the winds waft their seminal spores from pole to pole. They attack housekeeper's bread and cheese, her preserves, her paste, her ink and her n.† Her yeast consists of a living organism which is among the lowest of gi, and there seems to be abundant experimental proof that the various s of fermentations, acetous, vinous, lactic, &c., are due to different kinds of organisms, or different generations of the same species, all of which are fungi. attacks are not confined to the seeming dead forms of matter, but they havoc with our fruits, (as the peach, the pear, the plum,) and attack re- lessly the foreign gooseberry, and both the foreign and the native vine grape.

No class of organized structures is so little known, and the study of fungi is the most recondite of pursuits. This arises from their microscopic char- their strange growths, the variety of forms through which they pass, ng the researches of the closest observers. But enough is now known to w that they are perfect plants, growing from and producing bodies analogous eeds; that a single plant produces millions of spores, or reproductive bodies, are so small that they float upon the air scarcely affected by gravity; that y re in for an indefinite period inert, and are called into sudden vitality by eric changes favorable to their germination; and that their sudden ap- e can be readily explained to be due to natural causes, obscure only unseen. They have been traced through their changes from the infinites- ly all spore to the perfect plant; hence they are not the result of spon- generation, as has been imagined by some, though it would seem scarcely le for any intelligent person to conceive such an origin.

The earliest vegetation of these obscure creations is a prolongation of the nbrane of the spores or seminal dust, and not properly seeds, because merely vidual cells. From these proceeds a delicate, minute, webby growth called ne mycelium, the true vegetation of the plant, and from this arises the repro- ve bodies on which are formed the spores for future growth. It is this lium or close-growing mould which penetrates and destroys the object on ch it is parasitic, or has fastened itself. Its fibres are so minute as to readily erse the tissue or substance of the plant, and even the pores of solid wood, y be seen in the "dry rot." The spores produced from this mycelium are te as to appear like a cloud of impalpable dust. And when we consider how readily germs so minute and almost omnipresent, may be drawn up with the which enter through the roots, or may be received directly through the thing pores or plants, and remember that their office is to prey upon vegetable ances which are decaying, or have received a check through untoward at-

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* The theory of the "cryptogamous origin of malarious and epidemic fevers" was broached y Dr. John K. Mitchell, of Philadelphia, upwards of twenty years ago, as will be seen on onsulting his lectures bearing the above title, and republished in five essays in 1859. These ectures abound in facts of interest and value.

† Dr. Forry relates that, in Florida, he had known fungi to spring up in a night and to ncorporate themselves with a woollen garment so inextricably as to render separation im- racticable.

mospheric influences, we may be prepared to comprehend how they denly appear over widely distant regions, and commit ravages so app

So little is really known of the relations which these plants bear to the transformations they undergo, or the seeming transmigrations fro to another, under change of conditions, &c., that a wide field of inq open to the young and assiduous microscopist. When we state that producing fermentation in yeast, (or the true yeast itself,) will gro diseased scalp of a scrofulous patient, take root, and exist for ye check by the medical treatment attempted; that the fungus from worm," a disease of the skin, has been successfully used to produce fe (and that nearly as briskly as healthy yeast) when added to a barley finally, that forms of fungi considered distinct species cannot be di from each other, or from yeast, but that their differences seem to be pendent upon the kind of plant, or the diseased animal tissue on whic may chance to alight, we may well believe that much remains to be fore the naturalist will be prepared to fix the place in his system c common mildew of our vines and grapes. Accordingly, the best in cologists have not determined to what undoubted genus our vine mild Minds of the first class are, however, zealously engaged at present i dation of the structure, and in determining the laws which govern th and mysterious organisms.

To discover the causes of mildew and rot has exercised the ingenui inquirers. Some believe they have certainly found them in deep abounding humus, and retentive soils and sub-soils; all of which injurious in seasons of great atmospheric humidity, and conducive duction of the "rot." Others assume that the cause of the rot is a of the mildew, because they appear about the same time; but we bei good reason. Both these evils no doubt arise from some derangeme the normal functions of the vine—some departure from the conditions moisture, either in the air or in the soil, which are absolutely dema healthy growth and the maturation of the fruit. This must be self-evi it should also be equally clear that these conditions of temperatures an abnormal or excessive, are aggravated or rendered more injurious by t of soil or position—by some esteemed the direct and specific cause of A cause for the sudden and wide-spread advent of the mildew on leaves and fruit must be found as wide in its operation as is the re consequence; and must, therefore, be climatic, and climatic only. sketch of the meteorological changes which preceded and accompani and the freedom from its extreme effects in localities near wide wa these excessive changes of temperature and dryness were especiall point to the atmosphere and its fluctuating conditions as the controlli the derangement which prepares for the growth of the fungi spores.

Some may still believe we have not found this cause in the cold nigh from extreme dryness, and the hot days following immediately thereaf the leaves of the vine were not frozen, nor even appeared to be injur case. In reply, we may say that the extreme low temperatures, extreme high heats, accompanied by excessive dryness, are all condit favorable to the development of the spores of the mildew, which fee organized tissues; and that freezing is not necessary to prepare for be learned from the following passage from our highest authority in pl botany. A. de Candolle asserts, that "cold does not kill vegetatio chanical action proceeding from congelation of the fluids of vegetabl naturalists pretend. We recognize rather a physiological action in t for the vitality of the tissue is destroyed by a certain degree of cold, f

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* Journal of Microscopic Science, January 7, 1866.

tain degree of heat, according to the peculiar nature of the plant.' In the manner as the gangrene which follows the thawing of a frozen part causes death of an animal tissue, so the change or putrefaction which follows on l thawing will be the principal cause of the death of the vegetable tissue. illustrated by the immediate death of hot-house plants when exposed to erature several degrees above freezing." Herein lies the philosophy of change in the tissue of the leaves exposed to intense radiation through dry it night, followed by intense heats at mid-day in the same drying atmosphere. minute vessels are ruptured or dried up, and disorganized, so that decay is ed, and the ever-present spores of the fungus at once find a nidus in the ing matter, for the removal of which they were created, take root, penetrate eaves, or enwrap the berries, feeding upon the former and choking the latter, destroying the remaining vitality of both by their rapid expansion and fatal is.

OZONE AND THE VINE-MILDEW.

There are other atmospheric conditions, resultants of extreme dryness, or extreme humidity, or unusual cold, which indirectly affect the vine, and aid the levelopment of fungous growth. It has been suggested that the relative amount of ozone in the air, which may be a peculiar form of oxygen, (or a component of gas, if it be compound,) may exert an influence in promoting or preventing appearance of the fungi on our vines and on other plants Though much to be learned respecting the development and character of this mysteent, we already know the conditions most favorable to its production, as those inimical to its appearance, or at least to the active exhibition of its ies. We know that chemical action increases with increase of heat and hes with reduction of temperature, and that ozone is less prevalent in the during frosty weather. Moisture, to a certain amount, is favorable to chemaction, while an excess is detrimental thereto; and though there is less ozone he air when very dry, there is still less when it is very moist—a certain degree of humidity being favorable to its development and existence. Dr. Smalld, the meteorologist of Montreal, asserts that ozone is *never* present in dry and that the psychrometer will indicate its presence or absence. He adds, e and south winds are ozonic at Montreal, and that northeast winds from land are not ozonic; also that westerly and northerly winds do not bear e with them, though sea breezes with moisture are strongly ozonic. These onditions are, however, modified in other latitudes, as we have observed reeatedly that winds from the N., NE., S.E., and S W., may be strongly ozonic at ur station. Dr. Smallwood also has shown that there is a connexion between he amount of ozone in the air and the health of a district. Thus, during the revalence of cholera the amount of ozone is least, and the humidity was at the ame time diminished. Dr. Moffatt has concluded, from the results of a large umber of experiments in England, that ozone plays an important part in conrolling or preventing epidemics, generally by removing the cause prevailing in he infected air of a district. Finally, C. Kosman has ascertained at Strasburg, rance, that the green portions of all plants exhale ozone, the result of the hemical changes going on at the surface, or in the vessels of the leaf.

The origin of infectious diseases prevailing over wide districts has, in some nstances, been shown to be due to the presence of minute fungi, or rather to germs or spores, which are ever ready to take hold and grow in favorable and conditions; and we know that our grape-vines are sufferers from having many points of analogy with the above. Now, when we consider he appearance of mildew is invariably preceded by sudden changes in the spheric moisture or dryness, heat and cold; that excessively moist air as ell as excessively dry air are both unfavorable to the presence of ozone, which

acts so energetically in the destruction of fungi; that plants, when in health, give out ozone, and thus protect themselves from the devouring enemy ever ready to pounce upon the unprotected organism, we need not wonder that, during our oppressively moist days and unseasonably cold nights, the chemical changes connected with (or themselves the sources of) the vitality of the plant should be subdued or oppressed, the quantity of ozone in the air and on the leaf be diminished, and the torpid condition of the leaf render it an easy prey to the invisible but omnipresent enemy, and universal mildew be the result.

THE CATTLE PLAGUE IN EUROPE.

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The years 1865–'6 will be memorable in the annals of British farm stock. Long will farmers of the island kingdom painfully recur to recent scenes of suffering and pecuniary loss, in yard and field, in shed and byre, when medication seemed worthless and recovery impossible. Three millions of pounds sterling, or fifteen millions of dollars, may be a moderate estimate of the diminution of the meat supply and stock of the farm; but the indirect money losses flowing from the visitation in the cost of treatment and care, in diminished profits of pasturage, reduction of the aggregate stock of farm-yard manures, derangement of crop rotations, failures of farmers of moderate resources, increase in prices of meat, and other items of pecuniary damage, are not at present calculable.

The disease has distinctive characterestics, but they are so numerous that a confusion of names for it has arisen in different countries, at different times. Formerly it was known only as a murrain; a general designation for fatal diseases among cattle. In Germany, where its visits have often excited alarm and elicited medical inquiry, it has been known by a variety of hard words, given in accordance with prevalent theories of its nature, one of them signifying an impaction of the third stomach; others having reference to the condition of the liver; others meaning gastric fever, and malignant dysenteric fever. In France it is called *Peste*, and *Le Typhus contagieux des bêtes bovines*. Sometimes it is known as the Siberian Cattle Plague, which is liable to be confounded with the Siberian Boil Plague—an enzootic rather than an epizootic disease. Gamgee formerly called it Contagious Typhoid Plague. Typhus Boum Contagiosus is common upon the continent. In Great Britain it is the Cattle Plague. It is in all these localities the same disease, having the same symptoms, and attended with similar fatality.

HISTORY OF THE DISEASE.

It is deemed probable by European veterinary authorities that rarely has a period of fifty years elapsed without a visitation of some deadly cattle disease. Homer's Iliad, Virgil's Georgics, Columella, and several ancient agricultural writers, attest the correctness of such a view. The history of six hundred years past, more familiarly known, is full of references to these murrains, generally following in the wake of large armies, and spreading desolation among farm herds. These outbreaks were not always the present rinderpest. The Black Death, commencing in 1347, attacked men, horses, cattle, deer, bears, wolves, hares,

other animals. In 1709 all countries between Russia and France were cted. At this time 70,000 head perished in Naples, 100,000 in Silesia, ᴊᴊ,000 in the Netherlands. In upper Italy the plague was frightful in 1744, when 40,000 perished in Piedmont, 18,000 in Milan, thence passing into Germany destroying 200,000. From 1745 to 1749 the losses of Denmark were esti- at 280,000. It entered Sweden and destroyed 32,584 cattle in the pro- of Schonen, leaving alive but two per cent. of the horned stock. In 1745 t appeared in England for the fourth time. In 1774 the cattle of some of the French provinces were almost exterminated, and the losses were reported at 50,000 cattle, worth 15,000,000 francs. Just prior to the close of the last entury, in three years of war, Italy lost from 3,000,000 to 4,000,000. Faust stimated a loss of 10,000,000 head of cattle in France and Belgium from 1713 o 1796.

It is officially stated that the rinderpest, since 1711, in Germany alone has arried off 25,000,000 cattle, and that the cases of recovery have averaged but ne in four. Such is the fatal character of this disease, which has appeared in ll seasons, spares neither young nor old, and is little dependent on external ircumstances.

THE DISEASE IN GREAT BRITAIN.

Pro or Gamgee cites historical mention of five outbreaks in Great Britain ase identical with the present plague; the first in the year 810, extend- inro h Europe, manifesting its greatest power in Britain; the second in 1223 to 1225, attacking respectively Hungary, Austria, Italy, Germany, and British Isles; the third, nearly five hundred years later, in 1714, at which eriod all Europe was severely scourged; the fourth in 1745, continuing twelve years, in the third of which 80,000 cattle were destroyed by orders in council, nd in the twelfth and last the single county of Cheshire lost 30,000; and again, n 1769, when comparatively few cattle were destroyed. The present or sixth utbreak occurred in June, 1865, after three years of fearful ravages in several ortions of eastern Europe. In 1862, in the Austrian dominions, 296,000 attacks were reported, and 152,000 deaths. In 1863 it overran Hungary and its depend- ncies, as well as Gallicia, attacking 14 per cent. of all the cattle in those tries. Dr. Marsch, veterinary professor at the Agricultural College at Alten- , Hungary, writes of the recent visitation: "Within the last year the c ;e of the rinderpest has caused ravages among the cattle to an enormous nt, chiefly in the eastern crown lands." In 1863 the fatality amounted to o per cent. of the cases attacked in Hungary, 77 in east Gallicia, 81 in Croatia Sclavonia, 83 on the military frontier, 88 in Moravia, 92 in lower Austria, 94 in west Gallicia.

The origin of the disease in England is thus given by the "commissioners nted to inquire into the origin and nature of the cattle plague:"*

"Twenty-three days at least before the first outbreak in London a parcel of bullocks, the first it is asserted that were brought direct from that ry to England, were sold in the metropolitan market by the importer, a cattle salesman. They had been shipped at Revel, and landed at Hull; or them had been sold and sent to various places in the north of England, the rest despatched to London. The southern provinces of Russia, if not ne birthplace, are the constant home of a disease which, as we shall hereafter w, is identified with the cattle plague; and to this cause the introduction of ne plague into England has been often and confidently ascribed."

*The commission consisted of Earl Spencer, Viscount Cranborne, Councillor Robert owe, Dr. Lyon Playfair, C. B., Clare Sewell Read, M. P., Henry Bence Jones, M. D., ichard Quain, M. D., Edmund Alexander Parkes, M. D., and Messrs. John Robinson l'Clean, Thomas Wormald, Robert Ceely, and Charles Spooner.

Some obscurity hangs over the early history of this transaction, but the general belief is strong among intelligent Englishmen that the germ of the disease was imported from Russia in the cargo above mentioned.

In this second report, the commissioners say that the careful observations of medical officials "point distinctly to contagion as the means by which the plague was originated and propagated in London."

In France, to which country the infection spread, practical and efficacious measures were promptly adopted. Early in September last, transit and importation of all cattle was prohibited, and the refuse of all cattle of infested countries was strictly prohibited on all the frontiers; and the same prohibition was applied to countries bordering on those infested. No cattle were allowed to pass any of the frontiers without rigid and competent inspection. Such measures were adopted immediately upon the report of two professors of the veterinary school at Alfort, who were sent to make returns from official examination of the disease in Germany and England. Notwithstanding all this precaution, the disease was introduced in two different localities, almost simultaneously, in a commune in Pas-de-Calais, by an importation of two Durhams from England, and on the Belgian frontier by a cow purchased in Belgium. By prompt and vigorous action of the government, the disease was completely suppressed by the beginning of November, with the total loss of forty-three cattle. In December it again broke out in the Jardin d'Acclimation of Bois-de-Bologne, introduced by two gazelles imported from England. It spread rapidly to yaks, zebus, goats, and fallow-deer; but all infected animals were at once slaughtered, to the number of thirty-five, and all traces of the disease were extirpated.

In Belgium, where precautionary and radical measures, analogous to those which were so efficacious in France, were adopted, the number of losses has not exceeded four or five hundred.

Returns from South Holland show that out of 29,031 cases 7,410 were slaughtered, 8,966 died, and 9,896, or about twenty-four per cent., recovered. In Utrecht the number of recoveries appear to be unusually large, being 926 to 790 deaths, while few have been slaughtered. Here the action of the authorities was resisted by force, and had to be supported by military detachments; and in some cases the troops were beaten off by large bands of peasants, and were obliged to take the cow-sheds by regular siege.

Its spread in England and Scotland were in accelerating ratio from the period of its first appearance, June 27, 1865, at Islington, in a herd in which were two cows just brought from the metropolitan cattle market. The entire herd, numbering ninety-three, fell victims, with several others purchased afterwards. In certain districts in the vicinity of London four-fifths of all the cattle either died or were slaughtered.

Early in July the disease appeared in Norfolk county; soon after in Suffolk and Shropshire; thence it attacked county after county; and before the end of the month invaded Scotland. By the 14th of October it existed in twenty-nine counties in England, two in Wales, and sixteen in Scotland. The number attacked in the first week of October was 1,054; in the second, 1,729; and in the third, 1,873. Up to this date the whole number attacked was 17,073, of which but 848 had recovered, or less than five per cent.; 7,912 having died, 6,866 been killed, with 2,047 still on the sick-list. An analysis of the published returns shows that the percentage of attacks increased during 1865, and until the cattle plague act went into operation. Up to December, of every 100 cattle on farms or in sheds where the disease had established itself, 44 were attacked; to December 30, 51; and to January 27, 54. Of the total number known to

ı attacked, up to the culminating point of this fatal epizootic, there were 100 cattle—

Date.	Killed.	Died.	Recovered.	Unaccounted for.
'ember 4	36	43	5	15
'ember 11	34	44	5	15
ember 18	32	46	6	14
'ember 25	29	48	7	15
ember 2	27	50	7	15
ember 9	24	51	7	15
ember 16	22	53	8	15
ember 23	20	54	9	15
ember 30	18	56	9	15
uary 6	17	57	10	14
ıary 13	16	58	10	14
uary 20	15	59	11	14
uary 27	13	61	11	13

ficially reported total number of attacks up to March 24, 1866, a month decline commenced, was 203,350; killed, 39,487; died, 120,834; re- 28,656; unaccounted for, 14,373.

ıld be remembered that the cases reported are by no means all existing. ectors were unable to detect all the concealments practiced by butchers, dairymen, and farmers. A London cow-keeper acknowledged to the mmission that of forty-one cows that died or were slaughtered on his the inspector got the "knacker's" receipt for the eleven that actually ıe disease.

ire suffered more than any other county. While the first appearance ague in England was early in June, the first case in Cheshire did not til the first week in October. There was but a single attack which atal, and no new cases existed during the second week. Six cases during the third week, and twenty-three in the fourth, ending October m this time the disease spread rapidly, the new cases weekly through proving as follows, respectively: 40, 90, 279, 275, 343, 646, 943, Up to January 11, 5,761 attacks had occurred in three months, while animals had been killed. But this alarming condition of affairs was prelude to heavier loss and more widespread alarm. In two months frightful total of 39,739 was reached, but still only 747 animals had ed. With the execution of the cattle-plague act came instant and increasing amelioration. Up to September 1, 1866, the proportion of o total number of cattle exposed was 53.985 per cent.

disparity in its severity is seen in the different counties. The propor- ıttacks in Cambridgeshire was 21.232 per cent. of all the cattle in the in the metropolitan police district, 17.784 per cent.; in the East Riding hire, 17.537 per cent.; in Huntingdonshire, 12.583 per cent.; in the ding of Yorkshire, 8.888 per cent.; in Oxfordshire, 8.703 per cent.; in hire, 8.808 per cent.; Norfolk and Shropshire came next. Ten counties ɔw proportion, a fraction of one per cent., viz: Hampshire, Wiltshire, ire, Devonshire, Cornwall, Somersetshire, Gloucestershire, Worcester- icestershire, and Rutlandshire.

fficial returns up to October 13, 1866, show that the number of attacks in the island of Great Britain had been reduced to eleven cases. Total

number of attacks, 253,702; killed, 84,992; died, 124,303; recovered, 33,413; unaccounted for, 10,994—showing a total loss, in fifteen months, of about 220,000 animals. No one supposes this is the entire loss. It cannot fall much below a grand total of 300,000 if all the cases were ascertained. At only $50 per head the direct loss in cattle would be $15,000,000. Its indirect effects upon agricultural interests have cost and will still cost many millions.

CATTLE PLAGUE IN INDIA.

While the pest has been raging in Britain, it is worthy of remark that for two years past a fatal "murrain" has ravaged British Burmah, destroying 85 out of every 100 cattle or buffaloes attacked. An official commission has examined the subject in its various aspects, and Veterinary Surgeon T. P. Gudgin, of the second dragoon guards, has prepared an elaborate report upon the nature, causes, and treatment of the disease, which has recently been received officially by the Department of Agriculture. Buffaloes constitute a large proportion of the stock of the district, being stronger and more efficient workers than the common cattle. It appears that disease has committed frightful ravages among these herds from time to time for sixty years past, usually decimating the herds of horned cattle infected, often destroying them by hundreds, and sometimes sweeping off entire herds. It is found more prevalent in trading districts, in which the movement of cattle is frequent and extensive, while isolated districts and almost impenetrable jungles are comparatively exempt from its ravages. In 1864 heavy losses were endured, and in 1865 estimates of 100,000 victims were made. The plague is yearly becoming more widely disseminated, till cattle owners have yielded to despondency, and the cultivation of vegetable products, particularly of rice, has sensibly declined. The extension of the present outbreak, while in most cases traceable to infection, is charged measurably to epizootic influence, rendering the system peculiarly liable to attacks of the disease.

The cattle are not generally bred in the district. Purchases of buffaloes are usually made near the end of the dry period in anticipation of the approaching agricultural season; and it is in the beginning of the rainy season that the disease is most rapidly extended. Sudden access to luxuriant pasturage, after a reduction in condition from insufficient or innutritious food in time of drought, may aid, it is thought, in extending the disease and increasing its severity. The report discredits the assumption that the disease is indigenous, brought into existence by atmospheric changes, or generated by the soil, or by miasmatic poisons. It acknowledges the possibility that such influences may be predisposing, but not creative. The general healthiness of the country is assumed from the condition, size, girth, and immense muscular development of the buffaloes.

The character of the disease is analogous to the "rinderpest" of the mother country, if not identical with it. It appears to have the same symptoms of a malignant and infectious fever of a typhoid character, attacking the mucus membranes, running its course in the same period, characterized by a similar amount of mortality, and displaying the same post mortem lesions. It is propagated by means of infected clothing, drinking-vessels, hides, horns, and other material substances. The period of incubation varies from five to twelve days. Little has been accomplished by the use of medicines, or by any treatment whatever, in arresting the progress or reducing the death rate of this malady.

Efforts have been put forth to reduce the febrile action, restrain the diarrhœa, and raise the nervous energies. Epsom salts, sulphur, nitre, ginger, and camphor, have been recommended for the first stage; catechu and opium for the second; and linseed oil and spirits of turpentine for the third; but it is admitted of this course of treatment that "it does not promise much." It is claimed, however, in a report by Doctor Palmer, that the success of the turpentine and oil

ıt during the "Calcutta epizootic" warrants a fair trial in Burmah. The ves, too, are sedulous in administering such remedies as rice-water, the milk cocoa-nut, tamarind paste, pepper and salt rubbed into the tongue, oo" spirted into the eyes, earth-worms, chicken's liver, elephant skin, s bowels, and various charms. It does not appear, however, that native rinarians are more successful than European.

NATURE OF THE DISEASE.

medical authorities of Europe are divided upon many points touching the e and origin of this mysterious disease. Eminent official experimenters e examined, with a microscope magnifying 2,800 diameters, capable of rendering visible particles of matter a one hundred thousandth part of an inch in er, the blood, textures and mucous discharges of infected animals, without ering the principle of contagion. Chemistry, like the microscope, fails to t it. In its effects it resembles other animal poisons. It acts on cattle, s on sheep, deer, &c., but has never been communicated to non-rumi-

ne official investigations in England do not sustain the theory that it is disted by a wave of poisonous atmosphere flowing over a country, though it nunicated from sick animals short distances through the air. In the Albert ry College experiments, animals took the disease at twenty yards dise.* The professors do not venture to say how far the infection may be car- in the air. "A distance of one hundred or two hundred yards in some cases s to have given immunity, while in others beasts have been affected, and bly through the air, at longer distances. Possibly it may drift under circumstances, as in hollows or valleys, with an almost stagnant air, as, in an open country, and with a rapidly moving air, it may soon be so ted and oxidized as to be innocuous."

t is declared that the influence of varieties of soil is not very marked, and that eorological conditions produce no decided effect. In winter, crowding of cattle ther is said to be unfavorable, and in summer the freer movement of cattle n spreads the disease. It is thought that differences in elevation may ex- an important influence. In the county of Yorkshire, for example, having diversities of surface, and suffering severely from the plague, it is stated not a single outbreak occurred at a height of one thousand feet above the In other countries a greater severity of the disease has been noted in marshy low-lying districts.

writer in the Edinburgh Journal of Agriculture suggests the theory that erpest may depend upon geological formations for the facility of its propaon; and he asserts, after examining the locality of the several outbreaks in in, that it had seldom or never devastated districts where the soil rests upon older of the stratified rocks, the Cambrian, the Silurian, and the fundamental while the sandstone formation, both old and new, have apparently been icularly obnoxious to its ravages. Of the present outbreak, both in Great ain and on the continent, the remark appears to be true. A glance at the , in connexion with the published statement of losses in the respective coun- shows the mountain region (with older geological formations) to be absolutely npt from loss. Wales, for instance, an elevated and broken country, has entirely free from disease, except a few cases in the borders of the Flint

*The report of the Aberdeenshire Rinderpest Association claims that it was clearly estabd that the disease was not brought to any of the infected herds by cattle, and the evidence nearly as conclusive that it could not have been communicated by individuals. In support e theory that it was communicated through the air, it is stated that all these points were line, the nearest fifteen miles, the most remote forty miles distant from a hotbed of the se, in a neighboring county, from which a strong wind of high temperature was blowing e right period to allow the usual time for the incubation of the disease.

and Denbigh counties, in the immediate vicinity of Cheshire, (near Liverpool,) th worst scourged district in England. The mountain region of Scotland was similarly exempt. But two counties in all England escaped—Monmouth, adjoining Wales, and Westmoreland, among the mountains of the North of England. The disease, it is stated, was again and again introduced into the Scottish counties of Selkirk and Peebles, both Silurian in their formation, but died out without inflicting much injury.

Medical authorities, with few exceptions, unite in expressing the belief that the plague has never had a spontaneous origin west of Russia; and they generally declare that no clear evidence has been adduced to show that it exists there, except by the aid of contagion, yet is always found there so constantly that the eminent veterinarians, Jessen and Unterberger, deem it necessary to inoculate every head of horned stock in that country. It is said that foreign stock introduced into Russia fall victims more readily than native cattle.

Age appears to exert little influence, though it is affirmed by some that young calves and cows are more affected than oxen, and a lean or fat ox is liable to suffer more severely than one in moderate condition. Cows yielding milk, or in gestation, particularly at the latter part of the period, are more susceptible.

It seems probable that those causes which affect the health and vigor of all animals should not only predispose to disease but render its attack more violent and the prospect for recovery more doubtful, yet there are numerous cases in which herds subjected to impure air, poor diet, and bad water have fared better than those well fed in clean and well-ventilated sheds.

SYMPTOMS.

The visible premonitory symptoms, according to Professor Gamgee, "consist in shivering, muscular twitchings, and uneasiness. In some cases there is dullness, and in others excitement, amounting even to delirium and associated with remarkable sensitiveness. There is often a short husky cough. The appetite is irregular, capricious, and then entirely lost; rumination ceases. The animal grinds its teeth, yawns, arches its back, and draws its legs together under its body. The eyes, nose, and mouth are dry, red, and hot. The extremities are cold, though the internal heat is high. Constipation, as a rule, exists, and secretion is generally arrested, as indicated in milch cows by the milk at once ceasing to flow. The respirations are often, but not invariably, increased in frequency; expirations succeed the inspirations tardily, and with each there is a low moan; the temperature continues to rise, though the animal's skin becomes rigid, and indicates functional derangement by a staring coat, dryness, and eruption."

The professor's extended description of the progress of the disease, reduced to a few simple paragraphs, and relieved of its technicalities, presents the following conditions:

Redness of the visible mucous membranes appear, especially of the gums, lips, and papillæ on the inside of the cheeks, and is at first partial, pale, and patchy. Whitish opaque specks the size of a pin's head are seen; softening and exfoliation of the mucous surfaces occur, resulting in dirtyish yellow flaky appearances in the worst cases.

The muscular twitchings of face and neck are characteristic, but not so typical as the discharge from eyes and nose, which is first glary and watery, and afterwards turbid. Animals sometimes exhibit a similar secretion when suffering from catarrh, but it is always an early symptom of rinderpest.

Restlessness is a marked symptom. Lying down and rising, looking round to the flank, drawing the hind legs forward as if suffering from colic, are frequent signs. Severe diarrhœa sets in, and the animal becomes very thirsty. There is an increase in the severity of the symptoms in the night-time. The discharges are fetid, the urine scanty and albuminous.

Af three days the symptoms increase in severity. The dysentery is aggra- weakness increases, making standing or walking difficult. The pulse comes feeble, but rapid, beating from 90 to 130 per minute. The discharge from nose, and vagina increases; the cough becomes less audible; the muscle, s of the mouth, and nasal orifices are ulcerated with a greenish-yellow and what dense granular deposit. Stupor, drowsiness, quick breathing, fætor ne exhalations, jerking respirations, coldness of the extremities, and moaning, unfavorable symptoms in this stage. The fæces, at first dark and slimy, with detached masses from the mucous surfaces, are very fetid and more inged with blood.

In the last stage the mucous membranes acquire a leaden hue, the erosions are and blood-spots occur; and involuntary evacuation of excrement, extreme r of the discharges, lowering of temperature, and increasing retlessness, ken the approach of death.

here is improvement about the third day, followed by a relapse; ca of apparent convalescence occur, while the gastric and intestinal lesions ntinue; and in possibly two or three weeks, when least expected, alarming to supervene, with severe diarrhœa and other discharges, and the animal s n dies.

As early as 1757, during the twelve years' visitation of the plague in England, Layard, the historian of the disease in that day, thus identifies it with the nt malady: "The first appearance of the infection is a decrease of appetite; poking out of the neck, implying some difficulty in deglutition; a shaking of the head, as if the ears were tickled; a hanging down of the ears, and deafness; ness of the eyes; and a moving to and fro in a constant uneasiness. All signs except the last increase till the fourth day. Then a stupidity and lingness to move, great debility, a total loss of appetite, a running at the nd nose, sometimes sickness and throwing up of bile, a husky cough and ng. The head, horns, and breath are very hot, while the body and limbs cold. The fever increases towards evenings; the pulse is all along quick, ted, and uneven. A constant diarrhœa, or scouring of fetid green fæces, breath, and nauseous steams from the skin, infect the air they are ed in. The blood is very florid, hot and frothy. The urine is high-colored; fs of their mouths and their barbs are ulcerated."

The third and final report of the British commissions to inquire into the nature n of the disease gives a description of the visible symptoms following the ive period, of which the following is a brief epitome:

The first outward sign is the peculiar eruption upon the lining membrane of uth and of the vagina. In the following day a disinclination to eat and ite is observed.

Two days after the first sign, marked indications of illness are apparent, and this period the constitution is thoroughly invaded; and then ensue the head, the hanging ears, the distressed look, the failing pulse, the op- breathing, the discharge from the eyes, nose, and mouth, the eruption of n, the fetid breath.

In two days more there occurs a great diminution of the contractile force of heart and voluntary muscles, the pulse becomes very feeble and thready, the ory movements are modified, the temperature rapidly falls, and death y occurs in the fifth day from the first visible signs of disease.

A DISCOVERY.

The possibility of discovering efficient remedies seemed to depend upon the ability of indicating the existence of the disease by earlier signs than any le symptoms above recorded. The subject was referred to Dr. San- n and Professor Gamgee, whose investigations are declared to establish the

fact that the rise of temperature precedes any other symptom about forty· hours. The discovery is of practical value, in the opportunity for more pı separation from sound animals, for shortening the period of quarantine, an increasing the chances for success in medical treatment. Like diphtheria some other maladies of the human subject, this disease has so progressed i period of incubation, when no danger was known or suspected, that rec becomes difficult if not impossible. Within thirty-six to forty-eight hours the animal has taken the plague by inoculation the natural temperature from 102° to 104°, and sometimes 104½° Fahrenheit. No acceleration of is at this time apparent; eating, rumination, lactation, and other functio performed as in health, so far as can be distinguished by the most careful a ants. Dr. Sanderson was able, in eighty cases, to recognize the disease unfai by this rise in temperature. Professor Gamgee, called to test the inc existence of the disease in a herd of forty apparently sound Ayrshire cows which a few attacked with the disease had been separated, discovered an in of temperature ranging from 102° to 107°; and in seven days thirty-five number were dead, and none escaped the contagion. His test was ma inserting a delicate thermometer in the rectum, dipping the bulb in water a between each examination.

EFFECTS.

The effect of the disease upon the blood is to diminish greatly the s probably as a result of the intestinal discharges, and to increase the amo fibrine and corpuscles. The blood is drained of its soluble albumen.

The effect on the milk, as appears from analysis, is to increase the butter, and casein, while the sugar of milk is greatly diminished.

The urine is albuminous, and is not coagulable in the severest cases. coloring matter, often imparting a deep green color, is usually present.

Food remains undigested in the various reservoirs for its proper prepa for assimilation; the secretion of the gastric juice ceases; the intestines b the seat of inflammation, and the disorganization and destruction of the blo mucous membranes render recovery impossible.

Veterinarians have no faith in the attempted destruction of the virus living animal. When its efforts are palpable in visible symptoms of the d medication is powerless to neutralize it.

The disease is like other fevers in its periodicity, with abatement morning and increase at night. As in the pleuro-pneumonia, in certain c chronic, hectic fever exists, from which the animal sinks. While death u occurs between the third and sixth day, in some instances it supervenes twenty-four hours of the exhibition of active symptoms. A sudden aggra of alarming symptoms betokens approaching death; but convalescence is pr by a gradual abatement of their severity, and attended with such indicat a return of appetite, a moist muzzle, more equable temperature of the bo extremities, and restored secretions of milk.

MEANS OF PREVENTION.

The prevention of cattle plague has been sought in various expedient as the prohibition of stock importation from foreign countries, quaranti spection of frontier posts and town markets, slaughtering sick and i animals, indemnity, insurance, stopping of fairs and markets, the use of fectants, vaccination, and inoculation.

That non-importation may be relied on for protection has been repe shown; but to prove a certain safeguard, the protection must be absolu smuggling prevented. Ireland has no cities to feed with foreign meat, occasion for importing cattle; it is also isolated by ocean walls, and has, th

xempt from the infliction, notwithstanding the false alarm and consequent)f last winter.

;ienic management, where the pole-axe is not permitted full sway, may)lish something for the protection of uninfected animals. The diseased be kept warm in detached buildings provided with facilities for thorough .tion and drainage; the sheds, and particularly all urine and excrement, be disinfected; attendants should not be permitted to visit other farms, r markets; dogs should be kept tied, and utmost cleanliness should be ned at all times.

iene.—Among skillful veterinarians and sensible farmers, hygienic means pended upon far more than medication. It is preferred to clothe the animal than close the apertures for ventilation. Cleanliness and fresh air, with absorbents of noxious gases, are preferred to the vitiation of the air by ie or other gases evolved by disinfecting agents. Food is very sparingly at first, linseed tea or gruel; and afterwards, when purging begins, oat-ruel, free from coarse and indigestible portions of the meal. If appetite s, well-boiled mashes, made of beans or peas and other material, are used antage. Particular care is advised to prevent this food from becoming Vegetable mashes are preferable to milk or soups. Moderation in diet is ssential, and cold water should be frequently supplied for drinking.

lical treatment.—The administration of medicine has been resorted to in nds of cases under varying circumstances and in all sections, and ex-nts have been made with agents running through the whole range of *teria medica* with very little success, except to teach "how best to employ nes, so as not to aggravate the malady in animals which have a chance of ry." Medicines have signally failed as curative means, but may be aids roper system of hygienic management. It is thought possible, by the f medical investigations and experiments, to aid nature without unduly the animal system in those cases in which vitality resists disease with prospect of success. Medicinal agents have been used in every imagin-rm of application; have been introduced into the stomach, the rectum, en tissue beneath the skin, and the veins; and applications to the surface een made by means of poultices and wet baths. Stimulants, sedatives, ives, neutral salts, mineral and vegetable tonics, antiseptics, and mineral have been called into requisition in vain. Allopathic and homœopathic ent, water-cure, and botanic practice are attended with many deaths and res; and the result varies by a percentage too small for estimation if the has no treatment whatever. While the plague assumed a mild type in nstances, in others the fatality reached the high rate of ninety-five per From actual returns of ten thousand cases, under various forms of treat-he following tabular statement shows almost precisely similar results, ing 26.256 per cent.:

Mode of treatment.	Total number treated that recovered or died.	PERCENTAGE.	
		Recovered.	Died.
gistic	958	27.453	72.547
nd stimulant	2,301	25.858	74.142
ic	2,355	26.369	73.631
	1,173	25.831	74.169
otal	6,787	26.256	73.744

This is a more favorable showing than the average of recoveries throu the course of the plague, but the difference is fully accounted for by the ency to exaggerate the effects of a favorite mode of treatment, or by th that milder cases are selected for trial, and is not deemed to be due to mec tion.

The commissioners, in their third report, say that "with the widest di ences in the modes of treatment, there is hardly any difference in the al results, and the natural inference is, that the various drugs employed have duced very little effect.

The effect of dieting is more conclusive and favorable. Out of 503 cases diciously fed with soft mashes of vegetable food, 381 per cent. recovered; 813 cases are reported as follows:

Kind of dieting.	Number of cattle.	Recoveries, per cent.
1. Cottagers' cattle, generally fed on mashed food	95	7
2. Larger stock, where dry food was often given during convalescence	105	5
3. Cattle treated with mixed food of mashes and hay	303	2
4. Cattle fed with dry food, and treated medically with drugs	310	1

If 73 per cent. of cures could be expected, as in the case of cottagers' the plague would be, in a measure, disarmed of its terrors. The cases cit few in number, occur in comparative isolation, and under a mode of feedi , pe haps better than others calculated to fortify the animal against the attack; they may not be relied upon as a fair indication of the effect of such a mo treatment among large herds. It is scarcely safe to credit this success solely the mode of feeding, in view of the Scotch test, in large and small stocks, show ing that 62 per cent. recovered in 200 cases occurring in stocks of less t thirty, while the recoveries were but 22.2 per cent. in stocks of thirty to eig cows.

While it is shown that medicine is powerless to cure, and of doubtful valu an aid, even in hopeful cases, it is proved, to the satisfaction of the cattle co mission itself, that powerful drugs, of all kinds, heighten the mortality.*

A degree of success was at one time claimed for a modified homœopat treatment by two Belgian gentlemen, at Mathenesse, near Schiedam, in Sou Holland. Public expectation in England was excited in consequence, and experiment was undertaken. Of the result the commissioners write: "Ou the forty-five only one animal seems not to have contracted the disease; of rest, four recovered, and forty died."

Concerning the treatment of Mr. Worms, of which so much was bo consisting of the administration of assafœtida, ginger, onions, and garlic, w liquid food, it is declared that the restriction as to food was probably the important part of the treatment, for experience has shown that no reliance can placed on the drugs alone.

The official report refers to the inhalation of chloroform in favorable ter without venturing to indorse the treatment until further and more dec tests are made. The inhalation of oxygen gas is declared useless.

*The minister of the interior of Holland, in his report upon the cattle plague, says: ' mode of treatment has hitherto proved itself advantageous over any other. Veterinary p titioners seem to have found the greatest benefit from mineral acids, from quinine, and fr carbolic acid. A favorable issue depends, according to them, in a great measure on the c with which the beasts are tended, on cleanliness, and fresh air."

Similar statements are made by officials in various European countries.

British commission arrives at the broad conclusion "that in this as in ountries no drug has been found that can be recommended as either an te or a palliative," but that "it may, nevertheless, be desirable under ; regulations, and by the instrumentality of competent persons, to in- e the influence which certain specific agents may have on the cause of ease."

ulation.—The official report of Russian experiments relative to the protec- f cattle from rinderpest by inoculation was communicated to this department Russian minister through the Department of State. These experiments are bly the most extensive and long-continued ever conducted. A digest of oluminous history will illustrate the difficulties which medical men must ter in attempting to find a remedy or prevention of this mysterious disease. periments of a similar character were initiated, in accordance with the sug- n of Professor Jessen, of Dorpat, in 1852, with results so various and in- te that the government determined further and more thoroughly to test the s of inoculation. Accordingly an appropriation was made of ten thousand s annually, for three years, and a committee appointed, on which were ssors Jessen, Rawitch, and Roynoff, with instructions to continue experi- s in three established institutions for inoculation. This was in 1858, but operations did not commence till 1860, and then only at two points in n Russia—Salmysche and Bondarewka—under the immediate superin- e of Veterinary Surgeon Kobuscheff at the former place, and of Surgeon f at the latter These experiments continued through four seasons.

e results, though still various and in some respects conflicting, are interest- nd instructive. They show certainly the different degrees of susceptibility rent breeds, and the loss or destruction of the vitality of the virus with The wide difference in severity and fatality, noticed in the two series of iments, is readily suggested by the fact that matter from two to nine ns old was principally used at Bondarewka.

this place in 1860, 58 cattle were inoculated, 9 were very sick, and 3 died. st of these cases the matter was from five to nine months old. Reinocula- of 37 with fresh matter resulted in the sickness of 5, of which 3 died.

1861, 257 were inoculated inside of the institution, and 220 outside. Of mer only 5 were very sick, 177 were slightly ill, 42 had some symptoms disease, and but 1 died. About half of those outside had the disease mild form. In one experiment two animals were inoculated with slight and afterwards took the disease naturally, notwithstanding inoculation, and died.

the arrival of the commissioners in 1863, 295 had already been experi- upon by Veterinary Surgeon Sergeeff, of which 51 had slight symptoms, ad some cough and epiphora, 33 remained well, and 75 were not observed inoculator.

three years Sergeeff inoculated 1,028 animals, but used old matter, except 5 cases, of which 17 took very sick and 4 died. The loss of contagious n old matter is shown, further, by experiments of the commissioners upon Sergeeff's subjects with fresh matter, of which 9 took sick, and 4 died. In er case, 65 head were tried with fresh matter, and 39 were severely affected, 19 died, an unusual degree of fatality at Bondarewka. Matter from one to months old was tried upon 14 animals, all escaping infection; but upon culation with fresh matter 10 became sick and 3 died.

n one experiment two sheep were infected, and matter taken from them was cessfully in infecting six cattle; all were sick, and all but one died.

animals were frequently exposed to contagion with impunity, un- in which the symptoms were comparatively mild.

n 1860, the whole number vaccinated at Salmysche was 64; 36 took sick the first inoculation and 13 died; the other 28 were again inoculated, of

which 16 sickened and 7 died. Of the other 12, 10 were a third time inoculated, and 4 a fourth time, with only one animal in each case slightly affected. Of the whole number, 64, 53 animals were infected, and 20 died. No milder effect was produced by matter "of the fifth generation." Of three animals inoculated with matter of the second generation, two were infected and one died, while four animals died out of seven infected with matter of the fifth generation. In most of these experiments, matter over twenty-five days old had no effect.

In 1861 there were 151 inoculated, of which 69 remained well, 39 had slight symptoms of disease, 43 had it severely, and 24 of them died. These 69 and 4 others slightly affected were reinoculated; 43 of which sickened and 17 died. Of 27 inoculated the third and fourth time, 14 took sick and 8 died. In these experiments some that were slightly sick at the first inoculation died as the result of the second.

Some died after the third inoculation. Matter more than nine days old was found inefficient.

In 1862, the third year, there were 51 deaths from 130 infections out of 167 inoculations. It is a noticeable fact that of two breeds, the Baschkir and the Kirgis, less than a fourth of the latter became slightly sick, while about two-thirds of the former experimented upon were infected, and more than one-third of the whole number died.

Of 466 cattle inoculated by Veterinary Surgeon Kobuscheff at Salmysche, partly under supervision of Professor Jessen and Roynoff, from October 1, 1860, to July 5, 1863, 379 were infected, and 148 died. Thus about 80 per cent. of all took the infection, and more than 30 per cent. died.

In the experiments of the commissioners in 1863 are a few noteworthy features. In the fifth experiment, four animals that had been inoculated without effect were left to take the contagion naturally; all became diseased, and three died. In another instance, several animals mildly affected by a former inoculation were inoculated with fresh matter without effect. Again, in several cases, animals that had once had the disease were exposed to contagion with impunity.

Ten sheep were exposed to contagion, and five were inoculated without effect, and they encountered subsequent exposure unharmed.

It will be seen that in one location, and that in which the greater number of fatal cases occurs, ten sheep were entirely unaffected, while at the other station two were inoculated successfully, and matter of extraordinary potency obtained for further experiments upon cattle.

The following is a translation from the journal of the committee of their conclusions upon certain points, in view of the results of their experiments:

1. Is the rinderpest similar to the abdominal typhus of a human being, and to what degree?

The rinderpest must be considered as a contagious typhus *sui generis*, as well in its clinical as anatomical pathological appearance, and is very similar to the abdominal typhus of a human being, but different from the same by its rapid course and the constant complication of catarrh in all the mucous membranes

2. Is there any evidence that the rinderpest has its origin only or principally in the steppe countries of Russia, and that it was transferred thence to the other provinces of the country?

The rinderpest was brought from the steppe countries, but the place of its origin is not yet known. Therefore there is no positive evidence on hand to decide this question.

3. Are there any localities in Russia where the rinderpest began spontaneously?

Considering the reports on hand, there are places in the northern part of Russia where the rinderpest was developed by itself, but this assertion is difficult to prove, because no scientific examination has been made in these places concerning this question.

l. Is the rinderpest only contagious by direct contact with the infected ani-l or through miasmatic propagation?

The rinderpest is contagious as well by direct contact with the sickly or dead as by its exhalations.

o. Is the rinderpest alike contagious in all parts of Russia, and is the mor- the same everywhere?

The rinderpest is less contagious in the southern parts of Russia, and less there in comparison with other regions of that country.

o. Does the season influence the contagion of the rinderpest?

The rinderpest is less contagious in summer and winter than in spring and

7. Are certain breeds of cattle more disposed to rinderpest than others?

Not all breeds are alike disposed to contagion. The experiments at Salmysche at Bondarewka have shown that the Kirghis and south steppe breeds are disposed to contagion than others.

o. Do all cattle of a herd take sick at the outbreak of the rinderpest?

T s is the case sometimes in the northern part of Russia, but hardly ever in southern part.

9. Is the virus of the rinderpest mitigated by successive generations of the se?

So e cases have been very favorable to mitigation, but the latest experiments e shown that no mitigation of the effect of the virus took place even in the h generation. Therefore, in accordance with these results, mitigation of vir of the rinderpest cannot be expected. (Professor Jessen is against conclusion.)

10. How long does virus of the rinderpest preserve its power of contagion; has old matter the same effect as fresh matter?

The experiments made so far have not produced any positive results in de- ning the length of time that the virus will preserve its vitality. In some he virus lost its effect in several days, but in others it maintained the er eleven months. It is therefore remarked that the duration of the or the virus depends considerably upon the manner of preservation. Ex- nents have shown, as far as the difference in effect between fresh and old er is concerned, that inoculation with fresh matter generally causes a severe ness, but inoculation with old matter a slight illness, and in some cases that s without any effect.

11. Does inoculation with the rinderpest always preserve the animal from a epeated attack of the plague?

Animals which show strong characteristic marks of the rinderpest after inoc- on certainly will not again contract the disease, but those which show light toms of the sickness after inoculation are not always safe from a repeated k.

12. How long can an animal be considered safe after being inoculated?

The results obtained do not render it certain how long this immunity will perhaps it will extend through the whole life of the animal, but our experi- s only reach up to six years.

Experiments in inoculation with the virus of cattle plague, in England, tend show that in no degree is the severity of the disease mitigated by transmission the contagion through the bodies of sheep or goats, but that repeated trans- sion of the virus through cattle slightly weakens its power. Practically the mpt to destroy its virulence, or render the system of the ox insusceptible to influence, has proved a failure.

Disinfection.—It is universally conceded that a very important means of pre- ion is disinfection, or destruction of the animal poison. This poison is con- itly discharged from the diseased surfaces, and is also held in suspension i air; and the disinfectants employed must therefore be both fixed and

volatile, and should be harmless in their action upon men and cattle, and sufficiently cheap to make their liberal application practicable. Many substances were tried. Iron in various compounds, zinc, lead, manganese, arsenic, sodium, and lime, lacked volatility; iodine, bromine, and nitrous acid were either injurious or too expensive. The best disinfectants were found to be chlorine, ozone, sulphur, and carbolic and cresylic acids. The chlorine and tar acids, being liquid and æriform, efficient in application to solids or the poisons diffused in the air, were found very advantageous. It is assumed that chlorine and ozone act as oxidizers, destroying the vitality of the contagion; that the sulphurous acid destroys the virus by its antiseptic quality; and that the tar acids, without interrupting oxidation, arrest all fermentative and putrefactive changes, annihilating with equal certainty the germ of infection. Official experiments conducted by William Crookes, F. R. S., tend to show that the tar acids, with sulphur as an occasional agency, furnish the most simple and powerful means of disinfection. The experimenter anticipates valuable results from the use of these antiseptics, about farm buildings, manure heaps, and applied to sewage,* in preventing typhoid fevers, diphtheria, and that class of diseases in man; and asserts that sheep are free from foot rot, and potatoes from disease in tracts of land to which disinfected sewage has been applied.

In the course of the plague multitudes of exemptions from infection are noted, apparently due to disinfectants. In some cases, animals condemned, on the breaking out of disease in the herd, were respited by magistrates and saved, the disinfecting processes being continued. One proprietor using chlorine ex sively with his own herd lost none, while tenant farmers upon his estate l heavily. Similar cases were everywhere reported, and other instances are noted in which such processes were not sufficient to secure the safety of the herd.

Legal Means.—The most efficient of all repressive measures was the law of Parliament requiring destruction, with compensation. Local efforts were feeble, conflicting, and utterly unavailing. At first slow, gradually increasing and gathering strength in accelerating ratio, the progress of the disease was at last so fearful as to excite alarm in all classes, and sweep away as cobwebs the strenuously urged objections to so radical an enactment. October 7, more than three months after the disease broke out, 11,300 had been reported. The progress thereafter was as follows:

November 4	20,897	January 27	120,740
December 2	39,714	March 1	177,689
December 30	73,549	March 24	203,350

The effect of the law is well illustrated by reference to the great cattle counties of Yorkshire and Cheshire, which suffered terribly. There was more or

*The contents of sewers are beginning to be extensively used in England for farm irrigation.

ity in enforcing the law in the several counties. In Yorkshire, where strictness prevailed, the decline was most rapid:

Week ending—	YORKSHIRE.		CHESHIRE.	
	Fresh attacks.	Killed.	Fresh attacks.	Killed.
Before the act.				
6	2,028	28	1,883	14
13	1,508	48	2,317	13
20	1,314	40	3,547	9
27	2,034	36	3,448	7
3	1,426	23	3,005	3
10	1,455	17	4,671	11
17	1,836	51	4,378	8
After the act.				
ry 24	1,369	277	3,671	446
3	1,193	739	1,273	855
10	811	882	1,827	1,514
17	999	972	1,380	1,151
24	683	659	1,271	1,104
31	534	517	765	660
	338	330	808	707

total number of attacks, deaths, and recoveries throughout the island, the commencement of the destruction, for the eight weeks ending April re as follows:

Week ending—	Attacked.	Died.	Recovered.
3	7,310	3,271	2,102
10	6,518	1,185	1,151
17	6,261	779	1,014
24	4,704	318	543
31	3,996	154	394
	3,361	131	267
4	2,582	108	354
1	2,823	93	210
Total	37,515	6,039	6,035

decrease in the number of attacks has been regular since April 21. The r for the week ending June 23 was 500; July 28, 210; August 25, 160; nber 29, 43; October 13, 11. The disease is now nearly extinct. The umber of officially reported attacks in the first year, ending in the third of June, was 251,150.

re will be danger, for several months, of the reappearance of the disease, 1757, after twelve years of death and slaughter, when Layard wrote: disease, thank God, is considerably abated, and only breaks out now ien in such places where, for want of proper cleansing after the infection,

or carelessness in burying the carcasses, the putrid forms are still pre are ready, at a proper constitution of the air, or upon being uncovere perse such a quantity of effluvia that all the cattle which have not h be liable to infection."

The success of legal measures of repression in Great Britain w shadowed by the result of voluntary local law. In several instances ea season of the plague, the farmers of the county of Aberdeen, in Scotland, and provident, early sought to protect themselves and repel the invad association was formed, participated in by all of the parishes, eighty number, and a voluntary assessment of one penny per pound of the agr rental was made, collected at once, and four-fifths of the sum actually as a fund with which to compensate for animals killed. When the pla come, the first animal infected in a herd was slaughtered before the had progressed. If a second attack occurred the whole herd was imm slaughtered. The disease appeared in seven different centres, but so t was the destruction that the county was cleared of the pest before the of winter, with the loss of but three hundred and six animals, averagin and small together, a cost of £10 per head.

The English people, slow to ask for restrictions of commerce, espe food products, (and cattle particularly, of which from 5,000 to 10,000 ported weekly,) suffered much from the hesitating, dilatory, and irregula of the government. Orders in council were issued from time to time the movement of cattle, and prescribing various police details, the result o was to circumscribe the powers of the inspectors, to enlarge those authorities, and finally to replace the latter by new local authorities, wit sphere of jurisdiction; and between the several local authorities there p be no concert of action, and little prevention of disease. The Economi accounts for its rapid diffusion: "You could not persuade the English p hurt themselves so much until the evil was apparent. When the dise reached their own locality, when it got pretty near, when it had killed cattle of a county off, then the sluggish mass of common Englishmen w roused and awake; but not till then. Even the distant calamities magnitude would not move them to the constant exertion, the perpetual w the diffused and never-resting care which would be needful; and as the now is, when its ravages were a matter of figures, and but a small mat might as well expect aid from the English cattle as from the English pe or the smaller English farmer."

The plague still continued its ravages, the government as well as became alarmed, and a law was enacted, based upon the idea of crush the infection by wholesale destruction of infested herds, with partial co tion to owners.

BRITISH CATTLE PLAGUE ACT.

The existing act, as finally perfected, is of great length, and a brief s of its provisions must suffice. It provides for the slaughter by the local ities of all animals affected with the cattle plague, and for compensatio owners equal to two-thirds of the value of each animal, not to excee Every dead or slaughtered animal must be buried in its skin, cover quicklime or other disinfectant, and not less than six feet deep of earth. minute and thorough provisions secure the cleaning and disinfection of p and clothing of attendants, and prevent the introduction of other ani thirty days. Local authorities are empowered to require the slaughte exposed animals, if they see fit, and may allow the owners to sell the m shall pay for the animal if the owner prefers not to dispose of it himse sum, not exceeding £25, as may equal three-fourths of its value. It p

for compensation for slaughtering by any inspector, under authority of prior nts of August and September, 1865. It prohibits all markets, fairs, ns, exhibitions or public sales of cattle, except markets, for the sale of intended for immediate slaughter. Stringent regulations are required au rkets in the metropolis, to prevent the removal of cattle.

P second requires every person having an infected animal to give notice to ocal authorities, and to keep it separate from others, and forbids its removal the premises, its exposure for sale, or its passing along a public highway, n, or unenclosed forest or other land.

as provides that the compensation and medical expenses shall be defrayed, irds out of the local rate, and one-third from a special cattle rate, which be levied at any interval of time not less than three months, and in amount xceeding five shillings per head for all cattle one year old and upwards. The t of a farm may deduct from his rent half the amount of his rate.

J law provides relative to infected places—

1. That no cattle shall be moved out of or into an infected place, or along highway within an infected place.
2. No hides, horns, hoofs, or other parts of cattle shall be removed from an l place, unless with a license from some officer, appointed in that behalf local authority, certifying that such articles have not formed part of an afflicted by cattle plague, and have been properly disinfected, if neces-

3 No dung of cattle, and no hay, straw, litter, or other articles that have been in or about cattle, shall be removed from an infected place. And any u authority may make orders as to the shutting up of dogs in an infected , and the destruction of stray dogs found within or coming out of the same.

As to the movement of cattle, it requires all imported animals to be marked clipping the hair off the end of the tail, and no animal so marked may be red from the port of landing alive; and provides that no cattle shall be n except by railway, after sunset and before sunrise, except within the of the metropolis; that no animal shall be taken into any district in op- on to the prohibition of its local authorities; or at any time between sun- and sunrise be put on a railway.

It authorizes local authorities to prohibit or impose restrictions or conditions the introduction or removal of—

1. Any specified description of animals, excepting for a distance not exceeding o hundred yards, from part to part of the same farm.
2. Raw or untanned hides or skins, horns, hoofs, or offal of animals, or of any ecified description thereof, except hides, skins, horns, or hoofs imported into e United Kingdom from India, Australia, South Africa, or America.
3. Hay, straw, litter, or other articles that have been used in or about animals.

LAWS OF CONTINENTAL NATIONS.

In Russia the police regulations are very strict. On the breaking out of an izootic immediate notifications of the police authorities are enforced, and the eriff, with a politico-medical officer, a veterinary surgeon, repairs at once to e spot. The medical officer, after examinations, living and post mortem, defines e extent and nature of the disease, reports the facts to the local authorities, ving information of the number and breeds of the animals in the district. The al police then direct the adoption of measures of prevention. In villages thin the jurisdiction of the department of crown lands, the rural police are d by the local department authorities.

If t se local measures are not effectual, the chiefs of provinces, upon con- n with the members or inspector of the medical court, or committee of onc alth, devise other and more stringent means. Of the appearance, mode

of treatment, and final disappearance of the disease, the minister of the interi is fully advised.

Among the preventive means adopted in cases of cattle plague are the following: Separation from healthy cattle. Shepherds and cattle-feeders are not allowed to visit infected places. Purchases of cattle, milk, hides, or tallow, in infected districts, to be carried to healthy places, are forbidden. Persons attending diseased cattle must wash their hands in a solution of potash and vinegar, and change their clothes before approaching healthy cattle. When dead animals are removed in carts drawn by horses, care must be taken that no liquid matter is dropped. Neither skin, horns, nor hoofs may be removed from a dead animal which must be buried deeply, far from dwellings of man and feeding-places of cattle, in open rather than wooded spaces, where they may not be liable to be dug up by wolves or other animals.

In the Netherlands, provision has been made by law for the prohibition of importation and transit of cattle and the holding of cattle markets, and regulations have been established relating to the sale, treatment, and disinfection of living or dead cattle, meat, hides, hair, wool, dung, and other offal. Any animal removed and sold, to evade the provisions of the law, may be seized and confiscated, and punishment by fine of 25 to 500 florins, and imprisonment for eight days to three months, are penalties of its transgression. A liberal indemnification is made for all animals slaughtered by order if the disease has been made known by the proprietor himself.

Stringent regulations are enforced by law in Prussia. Medical treatment is forbidden, as also the recommending and publicly advertising of remedies.

Legal measures, various in character and complete in details as experience and practical wisdom are able to suggest, are also enforced in France, Belgium, Austria, Denmark, Switzerland, Bavaria, Saxony, Hanover, Baden, and by other (and probably all) governments of Europe.

AMERICAN CATTLE IN DANGER.

It would be strange if America should escape the visitation many years. Cholera, arising in the east, has traversed Asia and continental Europe, leaped the North sea, and passed the ocean barriers repeatedly. Diphtheria and other subtle animal poisons have been disseminated over islands and continents. Deadly murrains have decimated or destroyed the herds of all nations in all ages. Apparently new forms of disease appear occasionally, destroying particular genera of animals, while others escape unscathed. This cattle plague is not altogether new in Europe, having been traced back, by characteristic manifestations, a thousand years and more, during which time at least six separate outbreaks in Britain are chronicled. America has never yet been visited, so far as is known, but who can guarantee continued immunity?

When the red men roamed the forest alone, they were free from European infectious diseases. That exemption ceased with the landing of the colonists at Jamestown, and the arrival of the Mayflower in Massachusetts bay. Our cattle have hitherto been subject, in a limited degree, to occasional epizootic outbreaks, in their comparative isolation and freedom from disease-producing influences. Importations of foreign cattle are fortunately prohibited, yet infection may come at any moment, wafted by the winds of commerce, in a bale of wool, a bag of rags, a bundle of hides, a package of horns, a crate of crockery, or in a single straw, or in the clothing of a herdsman, for it has been proved that the infection can live and multiply after many months of rest.

And if it comes, what shall hinder its sweeping the country, and destroying as many millions of dollars as would suffice to connect the Mississippi and the Hudson by a ship canal that should be ample for the transportation of the ducts of a continent? We have had one warning. Pleuro-pneumonia, which

:d portions of Europe during the past half century, was a few years since ..uced into Massachusetts; and but for the prompt and vigorous action of the slature of that State, by which diseased and exposed animals were slaughtered the disease thus "stamped out," the losses of cattle-owners might have n many millions of money, if not millions of cattle.

}ut a worse than the pleuro-pneumonia is the rinderpest. In some countries recoveries do not exceed five per cent., and (if it is not a witticism) a portion those which recover ultimately die before they reach the butcher. Lancisi, reat Italian writer, declared that the cures spread the disease. When this ease approaches, the knife is the proper medicine, arterial bleeding the only :al cure; yet there would be hesitation here as elsewhere, and delay and with remedies. Already a dozen have been proposed in advance, and e oi ridiculous theories of its nature and cure propounded; and some have ized its actual outbreak in Pennsylvania, and others again in Kentucky. .can nature is human nature, and cattle plague history would again repeat . As in 1750, the sixth year of the fourth visitation, which lasted twelve ırs in England, when people complained that the sick beasts were not killed n enough, there would be loud outcries against the dangerous dilatoriness or cupidity that hoped for cures while spreading infection. As then, after of killing and saving, and the lamentation that "Cheshire might have n 6,000 if the farmer at Elton had killed his cattle," there would be the mistaken mercy mingled with wholesome severity, the same concealments n hesitation, similar declarations of the incurability of the disease and the ly of treatment, and after all, at the last record of the eventful history it would written of some Doctor Jones or Veterinary Smith, that "a never-failing ly had been discovered." Thus "hope springs eternal in the human ;," and the dire plague "never is, but always to be" cured.

Great Britain has enacted a stringent and effectual law, which effectually set a rrier to the regular weekly increase of attacks, and secured a constant and pid decline of the disease. The Congress of the United States would pass similar law for killing and compensating by wholesale. The matter has been broached among members of Congress, and State rights have n as a lion in the way. The subject is referred to the several States, as a of domestic and local concern, and here would be one great danger tne case of an outbreak in this country. Thirty-six States would have rty-six separate and diverse laws on the subject, but for the fact that half of :m would have none at all, at least for the first year or two, or until the in- was almost remedilessly spread throughout their borders.

ınen if the railroad system of England, with its systematic vigilance and hful care, is the means of extending the disease, what reeking infection .t not be conveyed on our uncleaned cattle trucks and uncared-for railway ue pens.

Scarcely a government in Europe has neglected to enact laws for arresting spread of this fatal disease. These laws commonly have the following ects:

1. To make it the legal duty of the stock-owner to give the earliest notice of approach.
2. To arm either the local authorities or the executive with power to isolate slaughter herds.
3. To make pecuniary compensation for animals slaughtered.
4. To provide a supply of competent veterinary surgeons.

t is urgently suggested, in conclusion, that State legislatures take up, at the iest possible moment, the question of permanent general enactments, appli- le to all virulent, infectious, or contagious diseases, and pass such laws as the ırity of farm stock within the several States may requre. Massachusetts already an efficient law of this character.

DONATIONS.

Donors and their donations to the museum of the Department of Agriculture.

Name.	Residence.	Articles.
Charles Roos	New Ulm, Minn	Sorghum sirup; grasshoppers and eggs; samples wool.
Tildon, Dep't Ag're	Washington, D. C	Bottle petroleum.
Hon. R. B. Miller	Utica, N. Y	Manufactures from epilobium fibre.
H. Cummin	Bethany, N. Y	Samples Spanish merino wool.
Dr. Winslow		Sapan nuts; sample cotton.
C. W. Wandell	Beaver, Utah	Rock salt from Arizona.
Judge Fisher	For Mrs. Phillips, Del	Cotton and cotton yarn.
James Sanders	Marietta, Penn	Tobacco and cigars.
J. H. Richards	Schuylkill Falls, Penn	Medlars.
A. L. Silar	Northup, Utah	Bottle of insects; petrified wood.
J. Pierce	Washington, D. C	Seeds magnolia grandiflora.
Hon. J. L. Driggs	Saginaw, Mich	Cabbage weighing 30 pounds; beet weighing 27 pounds.
W.S.Loughborough	Rochester, N. Y	Apples, Calvert and russet mixed.
V. D. Collins	For Chinese government	Seven cases of insects; samples sorghum sugar and sirup; varieties of paper, fibres, shoes, hats, agricultural machinery, coins, &c.
M. Guerin Meneville	Paris, France	Silk insects, cocoons, &c.
John Goddard	Greensburg, Ind	Sorghum sirup; samples of corn.
E. S. Whitney	Washington, D. C	Petroleum from Dunkirk wells.
Ransom Bullard	Litchfield, Mich	Sorghum sirup.
A. H. Wrenn	Mt. Gilead, Ohio	Corn.
Ch's Y. Sundell	U. S. consul at Stettin	Silk cocoons and pine fibre.
J. M. Davis	Washington, D C	Egyptian corn.
Prof. A. L. Fleury	Pittsburg, Penn	Oil rock from Mecca, O.; bitumens, &c.
H. D. Dunn	San Francisco, Cal	Nuts, spices, cotton, &c.
T. Banskett	Ocala, Florida	Native fibre.
Allen Crocker	Burlington, Kansas	Box lepidoptera; bottles insects; skins of animals.
Allan Dodge	Georgetown, D. C	Samples of corn.
O. H. Kelley	Minnesota	Saltpetre from tobacco.
H. D. Scott	Terre Haute, Ind	Samples of corn.
Josiah Wilson	Vinton Station, Ohio	Sorghum stalk 17 feet 7 inches long.
H. Ellsworth	Eugene City, Oregon	Oregon wheat.
J. F. Wilson	Iowa	Sorghum sugar.
John Pierce	Colorado	Petroleum coal.
J. H. McNall	North Star, Penn	Skin of Angora goat.
W. F. Geer	North Becket, Mass	Skins of rats.
Jules Laverriere	Paris, France	Cocoons and silk; colored plates of fruits; Ervum ervilia plant and seed.
Vilmorin, Andrieux	Paris, France	Album Vilmorin.
J. N. Russell	Fulton House, Penn	Samples of corn.
B. M. Bugby	California	Wheat, barley and rye.
J. S. Gallaher, jr	Washington, D. C	Silk reeled from Cynthia cocoons; artificial fuel.
Mr. Budd	Florida	Native fibre.
T. Glover	Dep't Ag're, Washington, D. C	Pine leaf fibre and cloth; rice paper; pyrethrum for destroying insects, &c.
Mrs. G. H. Pennfield	Hartford, Conn	Eight specimens emery rock.
R. O. Thompson	Brookfield, Mo	Cotton grown in Nebraska.
E. C. Rice	New York city	Thread from China grass.
G. J. Abbott	U. S. consul, Sheffield, Eng	Splendid specimens China grass (Boehmeria nivea,) manufactured by J. Wade and Sons, Bradford, England.
John Bowles	Augusta, Ga	Millet, two varieties.
E. W. Rogers & Sons	Whallonsburg, N. Y	Merino wool.
M. Dodge	Maryland	Red ochre.

	Residence.	Articles.
	East Roxboro', Mass	Yellow ochre.
	Greenville, Wis	Skins of birds and animals.
ı	Hoyleton, Ill	Sorghum sugar.
	Russellville, Ky	Skin of Angora goat.
	New York	Insect powder.
	Dep't Ag're, Washington	Guano from Patagonia.
	Denver, Colorado	Wheat and oats.
ds	Boston, Mass	China grass manufactured.
	Cape Vincent, N. Y	Bird skin.
	Marcellus, N. Y	Fullers' teasels.
	Colombia, S. A	Pita, fibre of Agave Americana.
'oldan	Colombia, S. A	Palm cotton; palm wool; sandals from fibre of fig.
	Cambridge, Md	Fibre.
Cotter	Elk Grove, Cal	Spanish merino wool.
d	East Cleveland, Ohio	Maple sirup.
	Corpus Christi, Texas	Cottonized flax.
ell	California	Box California raisins.
	Consul General in Austria	Silk and cocoons from Bohemia.
	Sandy Springs, Md	Oats.

METEOROLOGY OF 1865.

BY A. B. GROSH, DEPARTMENT OF AGRICULTURE.

from the monthly reports of nearly two hundred and fifty observers in more than and Territories of the Union, made to the Smithsonian Institute through this

sed and increasing attention of agriculturists to meteorology, as con- the science and art of tilling the soil, is one of the gratifying signs s, presaging a future of crops more carefully adapted to climate, cir- controlled so as to render harvests more certain, cultivators better l, markets more regularly supplied, and the aggregate resources of greatly and permanently increased. This, with the cordial recep- o essays in the annual reports of this department, in which meteoro- :iples and facts are applied to agriculture, requires that those interested e information that will enable them better to understand and apply nts made by those writers. The present volume contains similar ich, it is believed, will quicken and strengthen a desire to use these to acquire more information in relation to the climatic peculiarities of spread country.

is all. Those who are led to acquire information will also become impart it. There are many subjects on which the common farmer— ough he deem himself or be considered by others—may gather and e information valuable to scientific men as well as to his fellow- 'he general expansive and upward activity of mind in agricultural cates a dawn of important discoveries, to the unfolding of which is well as new may be greatly subservient. For instance and illus-

tration, the Rev. George A. Leakin, of Baltimore, Maryland, has requested this department to call the attention of farmers to well-remembered seasons remarkable for droughts or rain, scanty or abundant harvests, &c., and to communicate such facts and dates to this department. To use his own words in the letter referred to—

"While engaged as hospital chaplain, United States army, I was led to suspect a greater prevalence of the periodic law than was generally recognized Indeed, convinced of its universality, my main design was its extension into a realm hitherto unexplored, viz., the mental and moral. In this investigation, I could not fail to discover that famines, droughts, and abundant harvests, apparently fortuitous, were reducible to a sure recurrence, and that when the same observations were applied to them as to life insurance, we might guard against harvest failures with equal advantage."

This is already done in Great Britain. At least the "Royal Farmers' Insurance Company," in London, advertises to "insure wheat, barley, oats, peas beans, rye, turnips, clover, &c., against loss by hail-storms, at moderate rates." Mr. Leakin continues—

"Did my limited observation present no fact, I could no more doubt the connexion of periodicity with the field of agriculture, than the existence of gravitation in some unexplored island; but I have it in my power to send you the following extract of an official report made to our State Superintendent of Education on the statistics of Montgomery county, Maryland:

"'The climate, though variable, is healthy, and the seasons favorable for agricultural purposes. Four remarkable droughts have occurred within the past century: the first in the summer of 1806, the second in the summer of 1822, the third in the summer of 1838, the fourth in the summer of 1854—an exact period of sixteen years interval. Whether the same phenomenon will occur in 1870, remains to be seen.'

"I have been further informed, by a gentleman of the highest official authority, that 'in parts of Illinois, every seven years is marked by drought.'

"Strikingly coincident with the above is the following: 'The Paris Constitutionnel gives a list of the famines and periods of scarcity in France during the last three centuries, from which it appears that in general one year of want has occurred for every six years of plenty. These statistics are true in the main of other countries besides France. In England, where the cultivation is more thorough, the periods of scarcity are less frequent. In Poland, the Ukraine and the Danubian provinces, where farming is the rudest, they occur more often. *It is plainly owing to some law of nature, yet undiscovered, that these unfruitful seasons take place at comparatively regular periods.* They are probably the means of recuperating the soil. In this event the average production may be greater, notwithstanding the scarcity, than if there had been no bad crops. It is within the memory of all that the summer of 1854 witnessed an excessive drought. Shrewd agriculturists suggested, even then, that the parched condition of the ground would bring to the surface the salts which pervaded the lower soil, and of which the top had been exhausted by successive crops; and they foretold in consequence an enormous harvest for 1855. Whether the theory was correct or not, it is a fact that the result verified the prediction.'"

Now, Mr. Leakin, and the writers quoted by him, may or may not be correct—and the few instances given in proof are insufficient to establish their theory, and would prove a variable periodicity for different localities—yet the furnishing of the information requested, if it does no more, would refute the idea. and turn the minds now engaged in its support to some more profitable, because successful, labor. Even failure is often the precedent to great success. But if acts should be collected sufficient to unfold the existence of such a law for large sections of country, what an immense gain—what a valuable saving of time, labor, and crops—would result to the farmers and the nation.

] the above is given merely as an illustration, to show how valuable may e most commonplace contributions of facts, such as can be made by any wuo can write, to the interests of science. It needs only that the facts be red and truly remembered, with dates and attendant circumstances, and be nly and fully stated with their details, and they become mighty to the build-up or pulling down of the mere theories and speculations of the philosopher. observant farmer has it, therefore, in his power to furnish the foundation s and to build up the substructure of agricultural science in all its branches, skill and labor furnish the materials on which rest all the interests and rity, the wealth and resources of the community. And as he is to profit, , by the labors of men of science, as he profits by the manufactures and ce of the nation, it is his duty to do good in return, and communicate n in his power.

to return to our tables. It is to be deplored that many important sec-of States, and even whole States and Territories, have no reporting observ-and that even many of the reports regularly made do not furnish more But it is hoped that in time individuals may arise in all these places, will willingly labor to gather and report facts to the Smithsonian Institution, whose stores thus accumulated through long years, science may gather ials with which to build up systems that will bless mankind.

e have omitted the tables of averages this year. Those for several pre- years have been frequently given in the annual and monthly reports of department. Those for 1865 can readily be ascertained by adding the temperatures and rain-fall of a State or Territory, and dividing the total the number of stations to which they belong. We have also condensed the by giving the observations of two months in each table; though this ntly compelled us to omit the names of the highly esteemed observers io furnished the information. Their names, however, are given in previous and in many of the monthly reports. In some cases where two reports e furnished from the same locality, we have given that only which gave the st details.

The department respectfully solicits information of any errors or omissions in or former reports, that they may be corrected before any further use of tables.

All the observations, with slight or occasional exceptions, were made daily, hours of 7 a. m. and 2 and 9 p. m.; and the same hours are recom-l to all for the sake of uniformity.

METEOROLOGY OF 1865.

Places in States and Territories.	JANUARY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	FEBRUARY. Date.	Max. temp.	Date.	Min. temp.	Mea tem
MAINE.											
		Deg.		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg*
Steuben	9	36	17	—12	16.1	4.44	23, 26	40	12	— 7	21.
Lee	10, 13	34	20	—20	13.5	4.05	23	45	12	—20	22.
West Waterville	13	35	28	—13	14.7	4.90	26	46	12	—12	22.1
Gardiner	6, 10, 14	34	17	—22	15.3	3.10	23, 26	43	12	—14	22.7
Lisbon	14	35	17	—20	14.7	2.68	26	44	3	— 9	22.2
Cornish	7	39	17	— 6	14.6	3.93	23	45	12	— 4	22.3
Cornishville	7	50	16	— 8	16.6	3.72	23	43	12	— 1	22.0
NEW HAMPSHIRE.											
Stratford	6, 14	30	8	—18	10.7	3.00	23	42	13	—20	17.0
Shelburne	13	37	17	—18	16.8	2.42	23	48	12	— 6	23.5
Barnstead	6	38	28	— 2	19.5	2.70	21	49	12	1	26.1
Claremont	6	38	28	—16	16.3	......	23	48	14	—10	22.1
Do	13	39	28	—12	16.5	2.95	23	50	14	—11	22.6
VERMONT.											
Lunenburg	6, 10, 23	32	17	—25	14.8	3.35	26	65	13	—20	19.0
Craftsbury	14	32	8, 16, 18	—12	11.3	2.65	23	40	13	—12	17.4
Middlebury	13	36	18	—16	14.9	2.15	26	44	11, 13	— 8	19.9
MASSACHUSETTS.											
Sandwich	7	50	28	3	23.6	6.60	26	51	3	9	28.9
Topsfield	6	44	28	9	25.8	3.82	26	52	12	13	31.5
Newbury	6	44	28	— 3	19.9	......	23	51	12	3	26.9
New Bedford	7	48	29	4	23.3	5.18	26	47	13	6	29.5
Worcester	6, 31	40	8, 29	4	21.2	3.92	26	48	13	2	......
Mendon	31	40	29	0	19.2	......	26	48	12, 13	3	26.1
Baldwinsville	6, 14, 31	35	8, 28	— 7	13.7	4.02	23	43	......	—13	......
Amherst	......	......	......	......	......	......	23	45	14	— 1	25.0
Springfield	6, 31	39	19	— 9	19.5	3.23	26	48	12	0	26.3
Westfield	6, 14	36	19, 29	— 5	18.6	3.28	26	46	3, 13, 15	1	25.3
Richmond	6, 10	40	28	— 4	17.7	5.45	23	56	13	— 6	24.4
William's College	6	37	18	— 5	17.3	......	26	45	14	— 6	23.7
CONNECTICUT.											
Pomfret	6	38	8	2	19.2	3.55	26	45	13	— 1	25.5
Columbia	30	44	19	0	23.7	......	21	56	13	0	28.9
Middletown	13	42	19	— 4	21.7	4.16	......	......	......	......	......
Colebrook	6	38	19, 28	— 5	15.9	......	26	47	13	— 9	21.9
NEW YORK.											
Moriches	10	52	19	— 9	26.3	6.07	27	51	13	4	32.1
South Hartford	6, 23	39	18	—13	17.1	2.60	......	......	......	......	......
Fishkill Landing	14	41	21	— 1	18.5	2.82	23	51	13, 14	— 2	28.5
Garrison's	14	35	8, 20	2	19.0	2.46	17	41	13	— 3	24.5
Deaf and Dumb Inst	31	45	28	6	26.6	3.41	26	50	13	9	32.9
Columbia College	10	45	8, 28	7	22.8	......	26	44	13	5	29.1
St. Xavier's College	10	46	8, 28	8	24.6	......	26	50	13	4	30.3
Flatbush	10	46	19	4	22.9	3.36	26	47	13	5	29.3
Newburgh	14	40	18, 20, 21, 25, 26, 27, 28	10	23.9	......	23	50	......	......	......
Gouverneur	6	37	18	—28	13.3	1.48	26	45	13	—29	16.
Clinton	13, 23	40	8	—10	20.9	2.42	26	49	13	—16	25.
South Trenton	......	......	19, 26	—22	......	5.70	......	......	......	......	......
Oneida	6	40	8	— 4	20.7	3.80	26	54	13	—28	23.
Cazenovia	13	34	8	—16	16.0	5.70	26	46	13	—27	20.
Theresa	6	36	18	—31	12.8	1.13	26	44	13	—31	15.
Depauville	10	36	18	—14	16.3	3.60	......	......	......	......	......
Oswego	6, 13	36	8	— 4	20.1	3.95	26	45	13	—11	22.
Palermo	6	36	8	—14	15.1	3.40	26	45	13	—22	20.
Baldwinsville	6, 22	35	8	— 4	18.3	1.80	26	43	13	—11	21.
Skaneateles	22	34	8	— 7	17.2	......	23	44	13	—14	23.
Auburn	6	36	28	2	18.4	......	23	42	13	—16	22.
Nichols	13	40	27	— 9	17.3	......	26	52	14	—16	23.
Palmyra	22	42	8, 16	8	24.7	......	22	47	14, 15	6	28.
Geneva	13	39	28	4	20.3	2.54	26	45	13	0	23.
Rochester Univ.	22	43	8, 18	4	20.6	2.83	22	50	14	— 2	24.

Meteorology of 1865—Continued.

[States and Terr]itories.	JANUARY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	FEBRUARY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
[NEW YOR]K—Con'd.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
....	22	42	8, 18	4	21.1	2.83	24	50	14	— 2	26.8	1.74
....	22	37	18	— 6	20.4	4.31	22	46	13	—11	20.4	2.23
n........	9	41	20	— 9	17.2	......	21	53	12	—22	24.1	......
[NEW J]ERSEY.												
....	13	43	19	—11	22.3	4.89	26	49	13	0	29.3	4.60
....	10	44	19	3	23.2	4.09	26	49	13	1	29.4	4.57
iswick ...	6	44	19	— 4	22.3	......	26	52	13, 14	3	28.6	......
n	10	57	19, 28	4	24.3	4.15	26	56	13	— 2	30.9	3.80
....	13	40	19	4	23.0	4.05	26	49	13	2	29.1	4.90
illy	10	54	19	0	25.4	......	26	56	13	3	31.6	......
vn	10	54	28	6	24.8	......	......	......	......	......	......	......
ild	10	55	19	— 1	25.8	3.60	26	55	13	3	31.2	4.33
h	10	52	5	7	26.4	3.81	26	57	13	2	32.2	4.62
[PENNSY]LVANIA.												
n........	10	52	5, 19, 28	6	25.0	3.10	26	51	13	2	30.7	4.80
hia.......	10	51	28	7	26.5	3.60	26	54	13	4	32.4	5.49
own	31	44	28	2	......	......	17	50	13	1	......	......
d........	10	48	19	2	29.2	3.05	26	50	13	0	29.5	......
....	10	39	18, 19	—10	13.9	......	26	51	14	—20	21.9	......
....	13	42	28	1	21.6	......	23	49	......	......	......	......
hitehall...	22, 31	40	19	— 6	22.0	......	26	46	13	3	28.1	......
ring......	13	45	26	3	23.3	......	23, 26	49	13	— 6	28.3	......
y	13	46	28	4	24.9	3.15	26	53	14	— 5	29.9	2.10
g	13	39	28	9	25.0	4.15	27	44	14	1	29.5	3.51
g	23	38	20	— 9	19.4	4.73	23	45	14	—24	23.4	3.38
....	6	48	18	—14	19.3	2.36	26	55	14	—18	25.0	1.96
rg	13	43	28	2	21.0	4.24	27	47	14	—11	27.9	3.06
e.........	5, 6	41	19	— 7	18.5	3.24	23	45	13	—17	25.0	3.53
ille	22	49	8, 19	— 8	20.9	......	21	48	13	—16	28.6	......
urg	9, 23	39	19	— 8	......	......	21	46	13	—13	28.2	1.38
[DELA]WARE.												
ton	10	53	28	5	26.9	6.80	26	56	13	0	31.1	8.00
[MAR]YLAND.												
n.........	......	......	......	......	......	......	26	48	13	0	......	5.53
s.........	10	47	28	8	29.4	4.68	26	60	13	5	31.5	5.14
s.........	10	58	28	12	32.1	3.40	26	60	13	10	37.2	2.88
e.........	13	43	5, 8	5	22.1	3.50	26	50	13	2	27.6	3.50
[...C]AROLINA.												
....	23	66	1	19	42.4	4.76	27	72	10, 13	24	48.3	3.36
ead.......	21	68	27	24	44.5	3.63	4, 5	66	10	27	49.7	2.13
[TE]XAS.												
....	5	73	24	20	45.0	3.12	16	80	8	32	53.8	6.00
[MI]SSIPPI.												
....	3, 5	68	24, 25	20	44.7	8.05	3, 17	75	10	20	52.3	12.70
[TENN]ESSEE.												
le	5	53	27	8	31.4	2.38	20, 21	63	9, 13	22	41.6	3.97
[KENT]UCKY.												
s.........	5	47	28	— 6	25.8	3.41	21	64	13	16	38.4	3.54
g.........	22	50	28	0	......	3.65	21	64	13	12	36.8	3.30
....	21	57	1, 28	1	29.2	4.12	21	64	13	15	39.4	3.91
r	22	40	18, 20	— 1	19.6	......	22	47	13	—15	24.7	......
....	6	46	20	— 1	18.5	......	22	45	13	—26	21.0	1.60

Meteorology of 1865—Continued.

Places in States and Territories.	JANUARY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	FEBRUARY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
OHIO—Continued.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
New Lisbon	6	42	8, 19	—12	19.7	3.50	26	48	13	—20	28.3	1.48
East Fairfield	22	39	19	— 5	20.2	2.88	......	......	......	......	......	......
Steubenville	......	42	......	0	23.3	1.73	......	......	......	......	......	......
Welshfield	22	41	18, 25, 27	1	20.2	3.57	22	48	13	— 6	26.8	2.30
Milnersville	5	48	20	—14	19.7	2.63	25	50	13	—10	28.0	0.75
Cleveland	5	43	19	3	23.2	1.77	22	50	13	— 5	29.1	1.46
Wooster	5	42	19	—10	20.1	......	21	50	13	—10	28.4	......
Smithville	5	48	18, 19	—10	20.5	......	21	46	13	—10	28.3	......
Kelley's Island	9, 13	42	25, 26	3	23.2	1.27	22	46	13	— 8	28.7	1.53
Norwalk	5	45	19	— 2	21.7	1.17	21	54	13	— 6	29.0	1.40
Westerville	5	42	18, 25	— 3	18.2	1.80	25	54	13	— 3	29.0	1.30
Kingston	5, 22	43	30	1	23.2	3.51	21	55	13	6	33.3	1.32
Portsmouth	5	44	28	8	26.3	3.70	26	53	13	12	35.7	2.40
Toledo	......	......	......	......	......	......	22	50	13	4	29.1	1.09
Marion	......	......	......	......	......	......	22	48	13	— 4	......	......
Urbana University	22	42	1, 18	— 5	20.0	1.55	25	50	13	2	30.1	1.97
Hillsborough	5	44	25	— 2	23.6	3.19	22	49	13	7	31.4	2.36
Ripley	5	49	......	......	......	4.27	21	61	13	14	34.1	4.51
Bethel	5	43	25	— 1	21.4	1.29	21, 22	52	13	8	31.2	2.58
Farmers' College	22, 31	40	28	0	22.5	4.13	21, 25	56	13	8	33.0	3.78
College Hill	5	43	25, 28	0	22.1	3.70	20	50	13	10	33.6	3.13
Cincinnati	5	45	28	5	24.7	2.45	21, 25	57	13	12	35.2	2.43
MICHIGAN.												
Pontiac	5	41	20	0	21.1	......	22	48	13	— 9	26.2	......
Monroe	5	44	11	0	23.7	......	22	54	12	3	29.7	0.95
State Agr. College	5	39	27	1	21.1	0.65	21	44	13	— 1	26.8	1.76
INDIANA.												
Vevay	5	45	28	— 4	26.3	......	21	63	13	14	37.5	......
Pennville	13, 30	48	1	—11	20.1	......	21	58	12, 13	8	30.6	......
Spiceland	......	......	......	......	......	......	21, 22	53	9	15	32.5	2.40
Madison	13	41	28	— 4	26.3	4.25	21	62	13	20	39.3	5.50
New Albany	5	48	27, 28	2	25.4	2.80	26	64	13	17	39.1	1.30
South Bend	21	41	26	— 5	21.0	1.85	21	51	12	9	30.8	2.35
Indianapolis	31	45	18	— 4	22.2	1.72	21	59	12	18	34.7	2.94
Rensselaer	21	46	26	— 4	21.0	1.05	21	56	9	11	31.0	3.28
Bloomingdale	29	48	28	— 2	33.4	......	21	64	9	14	34.8	......
New Harmony	31	48	28	6	28.4	2.10	21, 25	65	13	20	38.4	2.82
ILLINOIS.												
Chicago	21	44	26	— 8	18.5	......	21	46	9	8	24.7	......
Riley	9, 20, 21	40	18	—15	17.8	0.60	21	48	12	5	28.4	5.30
Sandwich	9	51	25, 26	— 8	20.6	0.25	21	56	12	11	32.7	3.50
Ottawa	30	44	25	— 8	21.6	0.45	21	54	12	12	29.3	3.99
Winnebago	20	38	18	—18	17.4	0.27	21	46	12	5	28.3	3.25
Wyanet	12, 20	44	18	—11	20.2	0.30	21	54	12	8	30.8	3.40
Tiskilwa	20	42	25, 27, 28	0	22.5	......	21	53	9	13	31.9	......
Elmira	12	47	26	— 8	21.4	0.31	......	......	......	......	......	......
Hennepin	12, 20	42	19	—10	23.0	......	3	48	12	8	29.0	......
Peoria	20	48	26	— 2	24.2	0.22	21	56	9, 12	14	34.6	4.01
Pekin	......	......	......	......	......	......	21	57	9	10	33.0	4.82
Springfield	12	50	26	— 2	27.0	......	21	62	9	15	36.8	......
Waverly	20	45	26	— 5	23.7	0.20	20, 21, 25	53	9	8	32.8	5.6
Galesburg	20	41	25, 26	— 7	21.0	0.30	21	46	12	10	30.5	2.72
Manchester	20	51	26	— 3	25.1	0.25	21	60	9	14	35.9	5.23
Augusta	20	48	26	— 7	22.1	0.15	20	49	9	11	31.7	2.09
WISCONSIN.												
Manitowoc	21	41	18, 25, 26	— 4	20.6	0.27	21	43	12	4	28.4	2.01
Milwaukee	21	43	25	— 7	19.4	0.22	21	42	12	5	27.7	3.58
Green Bay	5, 20	37	18	—11	15.3	0.61	21	42	12	3	25.1	1.93
Geneva	21	40	25	—10	17.5	0.30	3	42	12	4	27.0	......
Delaware	20, 21	38	18	—13	16.6	0.17	21	49	12	4	27.1	2.3
Waupacca	21	40	18	—13	16.6	0.50	......	......	......	......	......	......
Embarrass	31	38	18	—22	15.5	1.00	1	40	12	— 5	25.3	[illegible]
Baraboo	20	42	18	—10	20.3	0.48	3, 18, 20, 21	42	12	6	29.1	......
Beloit	......	......	......	......	......	......	21	47	12	4	27.5	1.1

Meteorology of 1865—Continued.

ates and ries.	JANUARY.						FEBRUARY.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
OTA.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
r........	....	......	....	......	......	......	21	39	5	—11	21.3	1.20
....	12	38	24	—17	13.7	0.66	21	44	5	— 3	24.4	1.85
s	12	42	18	—21	13.0	0.75	21	43	19	— 7	23.4	......
....	4	41	18	—18	13.3	0.40	21	43	5	— 6	22.0	1.64
A.												
....	20	40	18, 25	—10	18.3	0.50	3, 16, 21	42	9, 12	10	29.2	8.50
....	12, 14	39	18	—16	15.3	0.24	21	45	12	8	28.6	2.19
....	20	44	18	—10	18.9	0.46	21	48	12	9	29.7	2.90
on	....	......	....	......	......	......	20, 21	47	9, 12	11	31.5	3.62
....	20	43	18	—13	14.1	0.29	3	42	12	3	26.0	2.28
r........	12 20	36	18	— 8	16.7	0.09	....	......	....	......	......	......
non	....	......	....	......	......	......	21	43	5	6	28.1	......
....	12	46	25	—10	20.5	0.30	21	48	5, 9	10	31.5	3.15
nce......	12	43	18, 26	— 7	17.9	0.25	21	42	9	2	23.0	7.00
....	12	46	23	—14	24.4	......	16	46	19	4	27.3	......
....	12, 20	40	18	— 4	16.9	0.16	21	45	19	4	25.2	6.27
....	12	43	24, 26	—14	15.3	0.60	21	46	5	— 1	22.9	6.25
URI.												
niversity	....	......	....	......	......	......	21	61	9	19	38.4	3.33
....	20	53	11	— 7	25.4	0.65	20	62	9	7	35.1	4.27
....	....	......	....	......	......	......	1	65	10	16	37.3	5.98
....	20	53	26	— 6	21.9	0.14	21	56	9	9	32.2	3.16
le	12	48	26	— 6	25.5	0.45	20	60	8, 9	16	34.0	3.20
....	12	48	26	—10	22.8	0.13	....	......	....	......	......	......
AS.												
....	12	52	26	— 6	21.6	0.53	20	62	9	8	32.2	5.49
l College	4, 19, 31	49	23	— 5	27.5	0.33	20	58	26	13	35.2	2.21
....	12, 19	55	26, 28	— 1	29.7	......	11	60	26	18	40.0	1.55
SKA.												
....	14	47	26	—12	21.2	......	2	45	5, 7	12	28.6	......
......	19	50	26	— 9	23.2	0.13	2	47	7	14	30.7	4.00
......	12	50	26	— 8	22.4	0.30	2, 20	48	5	10	29.3	7.75
H.												
LakeCity	2	45	25	— 2	24.0	1.22	....	......	....	......	......	......
....	30	65	23	14	42.0	2.40	17	63	22	19	39.5	0.83
GTON.												
....	....	......	....	......	......	......	10	48	28	24	37.0	9.30
RNIA.												
sco	27	60	22	32	48.7	4.40	10	59	21	35	48.2	0.99
......	....	......	....	......	......	......	11	57	4	38	49.1	0.53
lley	15	66	22	10	34.0	11.10	11	52	3, 22, 26	11	31.6	4.45

	MARCH.						APRIL.					
E.												
....	20	50	7	4	33.3	4.97	27	61	17	29	41.1	5.40
....	16	50	6	0	31.7	6.00	27	66	17	21	40.4	4.59
rville ...	29	51	7	4	33.5	4.50	27	73	9	30	44.5	4.40
....	20	52	7	10	34.8	5.39	27	70	26	31	44.9	4.43
....	....	......	6, 7	8	......	5.08	....	......	....	......	......	......
....	29	53	6, 12	10	33.1	5.18	27	73	4	28	44.4	3.50
s........	29	50	12	11	33.1	4.52	27	74	9	32	44.9	4.04
E.												
....	16	63	6	15	37.8	......	28	75	....	......	......	......
....	16	55	6	2	31.5	4.69	27	68	9	23	39.7	3.24

Meteorology of 1865—Continued.

Places in States and Territories.	MARCH. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	APRIL. Date.	Max. temp.	Date.	Min. temp.	Me tem
N. HAMPSHIRE—C'd.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	De
Shelburne	16	57	7	— 2	34.3	......	27	74	4	21	41.
Barnstead	20, 30	56	12, 13	15	36.2	4.78	27, 28	72	21	33	47.
Claremont	21	59	6	10	35.5	......	27	74	4	26	45.
Do	29	59	6	10	36.0	3.35	27	76	4	26	47.
VERMONT.											
Lunenburg	21, 22	78	12	0	49.9	5.98	27, 28	70	2, 9	20	41.
Craftsbury	30	53	12	0	30.2	3.13	26, 27	66	9	25	39.
Middlebury	21	66	12	8	36.1	3.95	27	72	9	28	46.
MASSACHUSETTS.											
Sandwich	21	63	12	18	40.4	4.95	19, 26, 29	67	4	30	49.
Topsfield	16	60	12	23	40.9	4.20	28	75	4	37	50.
Georgetown	20	61	12	15	36.9	......	28	79	4	34	48.
Newbury	16	62	12	14	37.8	......	28	80	4	35	49.
New Bedford	21	61	12	19	39.8	4.70	19	67	9	36	49.
State Lunatic Hosp'l	21	67	6, 12	18	39.2	4.72	27	79	4	32	50.
Mendon	21	68	6	16	39.2	......	27	79	24	33	50.
Baldwinsville	21	60	12	10	32.5	3.62	28	74	9	28	45.
Amherst	20	57	6	13	37.1	5.98	27	80	4, 9	33	49.
Springfield	21	72	6	14	38.0	5.07	27	85	9	27	48.
Westfield	21	63	6	14	38.4	6.29	27	78	21	34	48.
Richmond	21	72	12	10	37.0	7.79	28	76	2	27	46.
Williams' College	21	69	12	11	36.7	5.29	......	......	......	......	......
CONNECTICUT.											
Pomfret	21	69	6, 12	16	35.4	5.25	27	77	9	31	48.
Columbia	21	76	6, 12	20	41.5	......	27	80	3	33	51.
Middletown	21	76	6	17	41.0	4.75	27	84	9	35	51.
Colebrook	21	72	6	9	36.3	......	28	76	9	28	46.
NEW YORK.											
Moriches	8	68	11	22	44.6	7.31	19	73	3	37	53.
South Hartford	16, 20, 22	60	6	12	39.0	6.08	27	76	16	34	51.
Fort Ann	17	67	2	10	43.9	4.17	27	82	23	39	54.
Fishkill Landing	21	71	6	14	40.4	4.56	27, 28	78	3, 9	34	51.
Garrison's	21	69	6	15	40.3	6.40	27	77	3	33	52.
Deaf and Dumb Inst	21	71	11	22	45.6	8.32	28	81	17	40	54.
Columbia College	21	67	11	21	41.6	3.81	27	78	9	36	52.
St. Xavier's College	21	71	11	20	43.3	......	27	79	9	36	51.
Flatbush	21	64	11	19	42.4	3.97	27	75	3	36	50.
Newburgh	21	73	10	20	43.1	1.90	28	79	8	37	51.
Gouverneur	21	74	12	— 5	34.0	2.84	26	70	9, 24	27	44.
Clinton	16	72	12	9	40.1	2.32	......	......	......	......	......
South Trenton	16	54	12	8	32.5	6.35	28, 29	56	2, 8, 9, 22	28	40.
Cazenovia	21	82	12	4	37.7	2.96	26	73	9	28	47.
Oneida	21	71	12	10	35.5	2.82	26	74	9	30	48.
Sherburne	21	75	12	6	36.6	......	27	80	8, 9, 17	28	47.
Theresa	21	70	12	— 6	33.9	3.66	26	72	9	29	45.
Depauville	......	......	......	......	......	......	6	66	9	27	46.
Oswego	21	72	12	6	36.0	4.86	26	73	9	29	45.
Palermo	21	68	12	4	33.5	4.70	26	75	9	27	45.
Baldwinsville	16	63	12	5	35.4	......	26	68	9	28	45.
Skaneateles	21	68	12	4	35.5	......	26	72	2, 3, 16	30	45.
Auburn	21	76	12	8	36.6	......	26	80	3	32	52.
Nichols	21	76	10, 11, 12	10	39.9	......	26, 27	79	9	30	38.
Palmyra	21	75	12	14	40.7	......	26	76	9	32	49.
Geneva	21	73	12	10	37.6	2.05	6, 26	68	8	30	47.
Rochester Univer'y	21	75	12	6	36.8	3.17	26	74	8, 9	30	47.
Do	21	73	12	8	35.8	3.17	26	78	8, 9, 17	32	48.
Warsaw	22	77	12	3	39.4	2.47	26	75	2	30	46.
Buffalo	21	72	12	6	36.1	4.96	28	67	8	28	44.
Jamestown	20	78	5	0	38.1	3.80	26	76	17	27	48.
NEW JERSEY.											
Paterson	21	72	6, 11	19	42.8	7.36	27	79	3	37	53.
Newark	21	74	6	20	43.2	4.89	27	79	9	35	53.
New Brunswick	21	74	7	25	43.7	......	......	......	......	......	......

Meteorology of 1865—Continued.

States and [...]ories.	MARCH.						APRIL.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
[...]RSEY—[...]nued.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
[...]a	16, 21	72	6, 11	22	41.2	4.40	27, 28	76	9	36	52.7	3.15
....	16	76	11	22	45.0	3.42	....	......	....	......	......	......
[...]wn	....	......	....	......	......	......	25	79	9	38	55.1	2.72
[...]lly	21	74	11	23	46.2	......	28	78	9	37	54.8	......
....	21	70	10	20	45.3	5.20	27	78	2	36	54.7	4.30
[...]ld	21	75	11	24	46.2	4.17	27, 28	76	3, 9	39	54.4	2.80
[...]a	21	72	11	24	46.0	4.31	27	76	9	40	55.2	2.86
[...]LVANIA.												
[...]n	16	74	6, 11	24	45.7	4.60	28	77	9	39	54.0	1.40
[...]ia	21	76	11	25	46.9	4.88	27, 28	78	9	40	55.9	2.83
[...]wn	21	76	11	20	......	......	27	81	2	37	......	......
[...]l	21	73	11	22	44.6	4.99	26	76	18	30	53.1	2.11
....	21	72	6	1	34.9	......	28	75	3	22	44.6	......
....	28	78	12	22	43.5	......	26, 27	80	10, 23	37	53.2	......
[...]itchall ...	21	70	6	16	43.1	......	26, 27	80	3	31	52.7	......
[...]y	....	......	....	......	......	......	28	83	17	42	57.5	1.15
[...]g	21	72	6, 11	25	45.2	5.78	27	81	9	40	55.7	2.24
[...]g	20	74	6	15	41.2	6.47	27	80	23	34	52.1	2.36
....	21	74	6	5	40.2	5.30	27	82	9	26	50.7	2.23
....	....	......	....	......	......	......	28	79	14	25	52.5	2.95
....	21	73	11	7	38.6	6.24	6	74	17	28	47.1	3.42
[...]lle	20	74	10	8	44.8	......	21	80	1	33	53.6	......
[...]rg	20	71	10	20	42.8	5.10	21	77	2, 17	28	51.3	2.20
[...]VARE.												
[...]n	21	74	11	21	47.1	7.70	27, 28	78	9, 17	38	55.2	2.40
[...]AND.												
[...]a	21	70	11	20	46.0	6.10	27	74	10, 23	40	55.5	2.88
....	16	66	11	23	47.3	6.58	27	76	17	40	56.8	2.98
....	21	71	11	30	48.7	......	22, 26	76	23	45	59.4	3.48
....	20, 21	73	11	15	43.4	6.50	26, 27	76	6, 10	40	53.4	3.25
[...]RGINIA.												
....	....	......	10	20	......	......	....	......	14	36	......	......
[...]ROLINA.												
....	3, 23	78	11	40	58.2	7.11	....	......	....	......	......	......
[...]ad	22	77	17	45	58.1	6.83	18, 20, 30	83	1	54	69.1	1.10
[...]AS.												
....	20	80	9	26	59.4	6.51	3, 17, 30	83	21, 22	50	66.5	2.42
[...]SIPPI.												
.. ..	2, 7, 18	76	10	22	57.3	8.40	18, 19, 20, 29	80	25	43	64.3	8.61
[...]SSEE.												
....	19	75	10	16	50.9	7.98	20	80	9, 23	42	58.7	11.33
[...]CKY.												
....	15	77	10	15	49.5	7.86	4, 26, 27	77	8, 23	34	56.6	8.84
....	15, 20	72	10	16	......	5.88	20	80	8	34	56.8	6.52
....	15, 20	78	10	26	50.8	6.00	20	84	22	40	58.9	5.92
....	20	71	5, 10, 12	9	38.2	......	6, 21	73	16	25	48.1	......
[...]g	20	73	5	6	37.9	3.15	21, 26, 27	75	2, 7, 8, 9	32	44.7	3.25
[...]n	14, 20, 28, 29	70	10	8	41.4	5.44	20	82	17	30	52.5	3.72
[...]eld	20	71	10	11	41.8	5.56	....	......	....	......	......	......
....	20	70	10	8	39.6	5.36	27	77	8	29	49.3	3.97

Meteorology of 1865—Continued.

Places in States and Territories.	MARCH. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	APRIL. Date.	Max. temp.	Date.	Min. temp.	Mean temp.
OHIO—Continued.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*
Milnersville	20	75	10	10	43.0	4.38	21	82	17	27	......
Cleveland	20	74	10	13	41.6	2.62	26	79	8	27	50.3
Wooster	20	72	10	8	41.2	......	21	77	8	33	51.9
Gallipolis	......	......	......	......	......	......	21	81	2, 8, 17, 23	38	56.2
Kelley's Island	20	63	10	10	38.9	2.04	21	69	8	31	48.6
Norwalk	20	72	10	10	42.1	2.15	26	78	8	29	50.5
Westerville	20	70	10	18	45.2	3.73	26	74	7	33	54.0
Kingston	20	75	10	17	47.4	4.00	20	80	8	34	53.3
Portsmouth	20	73	10	19	47.0	6.15	21	77	23	38	58.1
Toledo	20	72	10	8	40.2	1.75	20	72	8	29	49.4
Marion	20	70	10	9	42.1	......	20, 27	76	8	30	51.8
Urbana University	20	72	10	9	43.4	4.68	27	78	8	30	53.1
Hillsborough	20	70	10	12	44.0	4.87	20	75	8	31	51.4
Ripley	15, 20	75	10	18	49.1	7.32	19	84	8, 23	37	57.8
Bethel	15	74	10	16	40.6	4.01	19, 20, 21	80	8	32	52.2
Cincinnati	15	75	10	15	47.3	4.40	20	81	23	34	56.4
Farmers' College	15	74	10	10	45.2	6.25	20, 27	76	8	32	54.5
College Hill	15	75	10	11	44.9	5.13	20	80	8	30	53.7
MICHIGAN.											
Pontiac	20	70	10, 12	10	36.3	......	21, 25, 26	70	8	26	47.3
Monroe	20	68	10	15	38.8	3.13	26	75	8	30	49.3
State Agr. College	20	68	10	9	37.0	2.79	20	71	8	26	47.4
Homestead	27	58	12	— 1	......	3.66	25	73	8	19	41.7
INDIANA.											
Vevay	20	78	10	16	48.8	4.82	19	82	8	34	56.4
Pennville	21	68	10	5	44.4	......	19	83	8	24	55.0
Richmond	......	......	......	......	......	......	19	75	8	28	51.5
New Castle	20	74	10	4	42.0	6.33	......	......	......	......	......
Spiceland	20	73	10	7	43.8	6.20	19	79	8	26	52.5
Madison	15, 20	74	10	20	50.2	12.00	......	......	......	......	......
New Albany	18	94	10	14	46.3	3.15	19	80	23	37	57.3
South Bend	21	69	9	3	38.0	3.30	26	77	9	25	48.0
Indianapolis	20	74	10	8	43.6	......	19	80	8	25	52.4
Rensselaer	20	72	10	0	39.2	3.78	27	74	8	16	49.2
New Harmony	20	76	10	16	48.2	4.93	19	83	8	37	56.9
ILLINOIS.											
Chicago	20, 31	64	10	— 2	32.9	......	17, 24, 25	70	8	15	43.4
Riley	31	63	10	— 8	32.8	4.60	17	72	8	13	45.5
Sandwich	31	68	10	0	37.9	3.82	......	......	......	......	......
Ottawa	20	74	9	0	36.5	3.15	17	77	8	21	49.9
Winnebago	31	62	10	— 5	32.7	3.58	25	75	8	14	46.8
Wyanet	[illegible]	[illegible]	10	0	36.0	3.13	17, 25	74	8	15	49.0
Tiskilwa	[illegible]	[illegible]	[illegible]	3	39.5	......	5, 25	70	8	18	49.4
Elmira	[illegible]	[illegible]	9	1	37.0	2.31	17	76	8	19	50.1
Hennepin	[illegible]	[illegible]	[illegible]	2	31.0	......	4, 25	60	8	2	35.3
Peoria	[illegible]	[illegible]	[illegible]	[illegible]	40.5	3.57	19	75	8	22	51.7
Pekin	[illegible]	[illegible]	[illegible]	[illegible]	40.1	3.74	19	80	8	22	50.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	45.2	......	19	88	8	32	53.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	41.3	5.55	19	81	8	27	51.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	......	......	19, 26	80	8	24	51.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.1	3.52	17	74	8	20	48.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	38.2	4.02	19	81	8	23	50.0
[illegible]											
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31.1	3.12	14	68	8	18	42.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31.8	3.19	5, 24, 25	71	8	16	44.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27.8	2.57	25	74	8	13	41.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	32.5	......	......	......	......	......	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	32.0	3.52	17	71	8	17	44.8
Van[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29.7	......	25	75	8	15	45.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27.5	......	25	76	8	16	41.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30.7	3.56	......	......	......	......	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	33.6	......	26	75	8	20	47.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	73	8	19	46.4

Meteorology of 1865—Continued.

…tates and …ries.	MARCH.						APRIL.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
…OTA.												
		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
…y	21, 22	48	11	—13	23.4	1.16	25	67	8	5	36.4	3.45
....	......	......	......	......	......	......	24	76	8	5	42.8	......
....	30	57	4	—26	24.9	2.10	24	77	8	8	44.2	4.29
…s........	30	56	4	—27	24.3	......	24	77	7, 8	8	44.0	......
....	30	58	4	—18	23.6	2.45	24	79	8	10	43.8	3.50
…A.												
....	19	64	9	— 9	33.2	7.50	4	78	8	22	48.2	7.50
....	20	61	10	— 2	32.0	3.33	25	75	8	13	47.4	3.92
....	19	64	9	— 4	33.7	2.76	4	75	8	15	44.1	6.00
…on	31	68	9	— 2	36.8	3.78	17	77	8	20	49.0	6.35
....	30	60	9	— 8	29.1	3.50	25	79	8	17	45.5	5.44
…........	30	57	9	— 3	27.8	2.60	25	72	8	18	45.2	......
…ion	19	63	9	— 5	31.7	......	25	78	8	11	46.9	......
....	19	70	9	— 5	34.3	3.92	25	75	8	20	48.1	9.31
…ce	30	60	9	—11	28.3	6.10	25	77	8	11	45.8	4.70
....	19, 30	58	9	— 6	31.0	......	25	74	8	20	46.4	......
....	20, 22, 26, 31	52	4	—15	26.3	......	24	74	8	13	44.0	3.52
....	30	56	4	—14	24.6	1.50	24	74	8	12	41.8	2.03
…URI.												
…niversity	17	71	9, 10	16	46.9	6.45	......	......	......	......	......	......
....	17	71	10	14	45.5	8.61	26	81	8	33	54.9	3.31
....	19	73	10	8	43.5	8.87	26	85	8	30	53.7	3.89
....	19	80	9	— 1	38.0	......	2	70	6	30	47.7	6.25
....	19	75	9	— 2	37.2	......	19	83	8	26	51.0	8.88
…le	20	74	9	— 4	40.5	3.43	4, 18, 19	76	6, 8	26	54.3	7.43
…AS.												
....	19	74	9	—16	38.3	3.65	......	......	......	......	......	......
…l College	19	74	9	— 8	42.0	2.27	19	76	6, 23	27	54.7	2.03
....	19	76	9	1	40.1	......	25	86	7, 8	30	52.9	1.13
…KA.												
....	19	64	9	—15	30.0	......	24, 25	76	8	17	45.6	......
....	20	64	9	—15	33.1	0.25	25	74	6	19	46.5	2.65
…l	19	62	9	—14	31.3	3.86	25	84	6, 8	22	......	6.73
…L.												
…ake City	24	62	9	6	37.7	2.38	28	76	6	20	42.5	2.43
....	23	78	3	24	49.1	0.01	30	96	6	29	57.4	0.52
…NIA.												
…co	28	65	2	38	49.8	0.49	20	70	11	43	52.2	0.81
....	31	71	2, 3	35	54.6	0.48	30	80	5	43	57.4	1.37
....	22	73	3	37	51.1	0.31	21	76	3, 6, 8, 18	44	53.1	0.36
…lley	......	......	......	......	......	......	24	79	5	23	48.1	0.75
…A.												
…le	......	......	......	......	......	......	30	88	6	24	46.9	......
…TON.												
....	......	......	......	......	......	......	20	57	1, 4, 5	32	43.7	6.50

	MAY.						JUNE.					
…E.												
....	17	76	3, 7	38	50.9	7.80	8	84	14	46	63.3	2.10
....	21	80	5	34	51.4	7.14	......	......	......	......	......	......
…ville	17	80	7	37	54.9	2.80	30	90	3, 6	52	67.8	1.35
....	17	85	6, 7	39	54.7	5.05	30	87	3, 6	50	63.8	2.68
....	......	......	......	......	......	6.07	30	91	......	......	......	1.45
....	17	91	6	38	56.1	5.71	4, 30	93	3, 6	54	63.7	2.30
....	17	86	6	35	54.4	5.30	25	93	14	51	68.1	1.90
....	17	87	6, 7	36	55.5	5.80	30	88	6	51	69.1	2.25

Meteorology of 1865—Continued.

Places in States and Territories.	MAY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	JUNE. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
NEW HAMPSHIRE.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
Shelburne	17	87	1	32	54.1	......	4, 30	90	3	35	77.8	......
Stratford	31	78	13	31	51.8	4.48	17, 18	88	3	43	64.8	3.23
Barnstead	17	87	5, 6	40	57.2	5.80	17	92	6	51	69.4	1.65
Claremont	17	88	13	34	56.1	6.20	17, 25	90	11	54	69.6	3.58
VERMONT.												
Lunenburg	15, 17, 31	75	5	32	48.1	6.25	19, 24, 25	92	7	32	67.3	2.75
Craftsbury	31	76	6, 13	34	50.8	3.70	18	84	3	50	63.7	3.92
Middlebury	17	79	2	36	55.1	4.19	17	84	3	51	69.1	1.85
Brandon	......	......	......	......	......	......	25	92	......	......	......	......
MASSACHUSETTS.												
Topsfield	17	88	6, 28	44	58.3	5.10	30	91	5	50	70.6	1.87
Georgetown	18	88	3, 6	41	56.2	......	30	91	5	50	69.3	......
Newbury	17	88	6	41	56.8	......	4, 17, 30	92	* 2	51	69.6	......
New Bedford	31	76	1, 3	46	57.7	6.17	30	83	1, 2, 5, 6	57	68.8	1.54
Worcester	17	85	1, 2, 13	45	58.0	5.43	30	85	15	56	70.5	1.72
Mendon	17	86	6	42	56.5	4.40	30	89	5	54	70.5	1.40
Baldwinsville	17	82	6	38	54.4	6.53	9, 17	85	2, 6, 15	52	67.5	2.10
Amherst	17	86	1, 6	43	57.1	7.89	4, 17	87	3	56	69.2	2.40
Springfield	17	95	13	36	56.7	8.39	18	95	9, 15	51	69.8	3.40
Westfield	17	87	13	40	56.3	8.32	17	87	3	53	69.1	2.82
Richmond	31	86	1	38	58.2	12.58	9, 17	92	11	55	72.7	5.40
Williams' College	......	......	......	......	......	......	24	88	3	49	68.6	2.93
CONNECTICUT.												
Pomfret	17	83	1, 6	42	......	2.12	30	85	6	54	......	4.31
Columbia	17	88	3	40	59.4	......	17	92	5	52	72.0	......
Middletown	17	90	13	44	59.7	6.85	3	92	6	57	72.2	2.41
Colebrook	17	83	2, 12	40	56.2	......	4, 25	86	6	55	69.3	......
NEW YORK.												
Moriches	31	82	12	47	61.1	5.97	23	90	2	60	72.9	2.28
South Hartford	17	90	12	36	58.9	7.53	18, 25	90	3	58	73.0	3.99
Troy	17	88	12	40	58.5	5.93	4	89	3	57	71.6	1.74
Fishkill Landing	17	85	1, 12	46	59.7	6.45	30	90	9, 10	60	69.9	3.78
Garrison's	17	86	12	41	56.7	7.11	4, 30	89	14, 15	59	70.0	6.54
Throg's Neck	17	81	1	47	59.0	......	18	90	6, 15	58	71.0	......
Deaf and Dumb Inst	17	87	12	46	63.1	5.56	3	94	15	62	77.1	10.42
Columbia College	17	84	12	46	59.7	3.97	30	92	6	58	72.7	2.97
Flatbush	17	82	2, 12	45	57.8	5.63	30	91	12, 15	58	72.2	3.58
Newburgh	17, 31	85	1, 12	46	......	7.00	30	90	6	61	......	4.10
Gouverneur	20	82	2	33	54.9	1.51	18	92	10	52	68.8	3.91
South Trenton	17	78	11	30	55.6	2.85	18	92	2, 14	50	70.2	5.40
Cazenovia	17	83	3, 12	38	56.3	3.99	24	90	13	51	69.0	3.61
Oneida	[illegible]	[illegible]	2, 12	[illegible]	57.3	5.40	25	90	2, 23, 27	56	69.2	5.58
Sherburne	[illegible]	[illegible]	4	[illegible]	55.2	......	28	88	27	48	65.4	......
Theresa	[illegible]	[illegible]	11, 12	[illegible]	55.9	3.03	18	90	10	51	67.4	4.04
[illegible]	[illegible]	[illegible]	2	[illegible]	58.6	......	18, 19, 25, 29	86	11	55	68.2	......
[illegible]	[illegible]	[illegible]	2, 12	[illegible]	56.8	2.60	29	86	13	53	66.0	5.95
Palerm[illegible]	[illegible]	[illegible]	1, 2, 12	[illegible]	54.9	3.30	7	94	13	52	68.1	8.80
Baldwi[illegible]	[illegible]	[illegible]	2, 3, 12	[illegible]	54.8	......	7, 17, 25	84	3, 28	54	67.4	......
[illegible]	[illegible]	[illegible]	1, 1[illegible]	[illegible]	55.1	......	25	89	13	52	68.4	......
[illegible]	[illegible]	[illegible]	1	[illegible]	62.2	......	25	92	11	56	73.5	......
[illegible]	[illegible]	[illegible]	11, [illegible]	[illegible]	57.9	......	18	93	27	55	71.7	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57.1	......	25, 29	89	11	55	69.5	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.1	3.92	29	94	11	55	69.1	3.56
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57.1	3.30	25, 29	91	10, 11, 13, 27, 28	58	66.7	5.43
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.1	3.30	6, 25	90	11	57	70.1	5.43
Buffa[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.0	3.38	6	94	10	55	70.0	2.78
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57.4	4.30	6	92	1[illegible] 23	55	70.7	7.30
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	61.6	7.88	18, 30	94	12	59	74.1	7.11
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	59.3	[illegible]	18, 30	89	5	58	71.7	3.49
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39	[illegible]	6	60	67.3	......

Meteorology of 1865—Continued.

States and ...ories.	MAY.						JUNE.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
...RSEY—...nued.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
...olly	17	85	2	41	61.7	......	30	89	6	59	73.5	......
...n	......	......	......	......	......	......	30	89	6, 7, 12, 15	60	72.1	4.50
...wn	......	......	......	......	......	......	5, 30	89	6	59	73.8	3.70
....	......	......	......	......	......	......	30	92	12	59	74.3	1.80
...ld	17	82	12	45	61.9	7.87	5	87	6	62	73.6	4.68
...h	17	81	2	44	61.7	6.04	5, 30	86	6, 7, 12	63	73.8	1.82
...LVANIA.												
....	17	92	4, 13	28	......	8.95	1, 4, 13, 22, 30	88	7	58	72.2	8.40
...n	17	83	1, 12	45	62.0	6.00	5, 30	90	6, 15	61	73.3	3.70
...hia	17	84	2, 12	46	63.4	7.69	30	93	6	64	77.3	4.82
...wn	17	88	12	42	......	......	4, 8	94	6, 11	61	......	......
...d	17	81	1	43	60.3	6.15	30	88	15	60	72.9	5.13
....	17	85	4	28	44.1	......	25	90	15	53	67.2	......
....	17	87	1	40	61.6	......	13, 18	92	15	57	73.7	......
...itehall ...	17	84	4	38	61.0	......	5, 30	90	24	57	72.7	......
....	17	84	12	41	62.2	7.40	9, 30	88	11, 15	62	74.2	5.66
...ring	17	88	1, 12	42	62.0	......	5	93	15	56	75.2	......
...y	17	88	1	47	66.2	4.75	4	100	1, 11	69	80.0	2.80
...g	17	87	12	45	63.7	8.57	4, 5, 24, 29	91	15, 28	67	79.1	2.12
....	17	90	4	36	58.7	3.01	1	92	27	57	71.1	3.98
...g	17	88	12	41	59.5	5.48	4, 18	88	27	58	73.3	5.22
....	17	92	3	32	58.8	4.82	17	98	28	50	71.8	7.64
....	17	88	2	34	57.1	4.53	5, 7	92	28	55	70.6	3.64
...ille	17	86	1	32	60.6	......	5	92	11	60	74.1	......
...rg	16, 17	82	2	30	58.7	4.68	7	88	27	56	71.6	6.65
...VARE.												
...on	17	85	2	42	62.5	5.80	5	92	12	63	74.2	3.30
...LAND.												
...n	17, 31	80	12	43	61.8	5.75	5	90	15	60	76.3	4.93
....	17	81	2	42	64.8	6.34	30	91	6	65	77.3	2.15
....	18	81	2, 12	43	62.4	7.00	5	91	6, 15	63	72.8	4.25
...RGINIA.												
...urt-House	16	86	12	40	61.5	13.27	8, 29	90	1	56	74.6	3.63
...AROLINA.												
...ad	23, 24	87	28	61	73.9	3.20	14, 16, 17, 28	92	2	70	81.0	6.93
...AS.												
....	25	103	11	51	75.4	0.17	25	96	29, 30	69	80.6	5.29
...SIPPI.												
....	22	86	12	45	70.3	0.35	6, 7, 10, 24	87	27	65	78.5	3.14
...SSEE.												
....	20	83	12	41	65.4	3.39	23	90	1, 2	62	74.6	2.68
...CKY.												
....	16, 21	86	12	33	61.4	7.57	18	91	1	54	75.6	3.86
...g	5, 16, 17, 21	80	12	40	62.7	8.98	5, 6, 7, 23, 24, 29	88	1, 26	64	75.0	4.05
....	15, 16	86	12	39	64.5	5.82	5, 6, 7, 29	92	1	67	76.6	4.84
....	5	84	12	38	......	......	29	90	1	61	75.9	......
...IO.												
....	16	86	12	37	56.3	......	7, 25	90	10, 11, 21, 22, 27	58	71.6	......
...g	16	86	11	30	57.8	2.80	25	90	11, 21, 27	57		

Meteorology of 1865—Continued.

Places in States and Territories.	MAY. Date.	MAY. Max. temp.	MAY. Date.	MAY. Min. temp.	MAY. Mean temp.	MAY. Rain or melted snow.	JUNE. Date.	JUNE. Max. temp.	JUNE. Date.	JUNE. Min. temp.	JUNE. Mean temp.	JUNE. Rain or melted snow.
OHIO—Continued.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
New Lisbon	17	93	12	35	64.1	2.26	5, 6	98	1, 11	62	77.5	6.27
Welshfield	17	85	1, 11	36	58.5	4.87	5, 6, 17	90	10	56	73.3	6.38
Milnersville	16, 31	85	2	28	......	2.94	......	......	......	......	......	......
Cleveland	16	86	1, 12	40	58.1	2.27	......	......	......	......	......	......
Wooster	16	87	11	34	59.9	......	6	93	10	59	74.6	......
Gallipolis	16, 17	84	12	34	61.1	10.09	6, 15, 17	90	10	58	74.4	......
Kelley's Island	31	83	11	39	59.3	2.46	6	92	26, 27	60	74.5	2.77
Norwalk	16	85	11	34	58.9	2.78	18	92	27	57	72.4	4.08
Westerville	16	82	11	36	63.8	5.76	......	......	......	......	......	......
Kingston	16	86	12	34	62.4	9.62	6, 18	92	1	62	75.9	3.42
Portsmouth	16	83	12	41	63.9	10.45	29	88	1	65	76.6	1.45
Toledo	16	86	11	39	59.7	2.25	6	93	26	54	73.3	3.63
Marion	16, 23	83	11	35	59.7	2.71	24	94	10	59	75.0	3.37
Urbana University	16	86	11	34	61.6	4.11	6, 23	90	1, 10, 11	60	74.5	5.06
Hillsborough	16	81	12	34	60.8	8.30	6, 18	87	27	58	73.4	4.01
Ripley	15	93	12	41	64.6	10.94	6	97	2, 26	65	78.5	3.75
Bethel	16, 17, 21	85	11	35	53.0	8.63	6	91	21, 27	60	73.2	2.23
Eaton	16	83	11	39	60.5	10.30	5, 24	87	27	60	73.0	3.49
Cincinnati	16	88	12	42	65.4	8.46	24	93	27	63	77.8	1.83
Farmers' College	16	84	12	32	61.2	9.05	6, 7	88	26	64	......	4.03
College Hill	16	85	12	35	61.7	7.88	6, 7	92	1	60	75.2	2.00
MICHIGAN.												
Pontiac	31	84	11	36	57.6	......	6	90	26	52	71.1	......
Monroe	16	85	1	40	59.5	1.42	17	90	26	54	73.8	1.99
Manchester	16	90	11	36	58.6	......	5, 6, 18	94	26	52	72.5	......
State Agr. College	31	83	1, 11	39	57.7	1.77	18	90	10	52	70.8	3.57
Homestead	31	88	10	29	55.6	......	17, 18	92	10	47	68.3	......
INDIANA.												
Vevay	21	89	11	40	64.4	11.80	24	97	1	63	77.6	2.45
Pennville	16	87	11	36	63.9	......	6	94	27	57	72.9	
Richmond	16	82	11	37	60.0	5.79	6	91	26	56	73.1	4.49
Spiceland	15, 31	84	11	39	59.1	6.50	6	93	26	55	74.8	6.80
Madison	16	80	12	44	......	10.74	......	......	......	......	......	......
South Bend	5, 16, 31	87	1	32	59.5	1.30	17	92	25	50	73.8	4.13
New Albany	16, 21	85	11	40	64.1	5.92	6, 18, 24	90	1	62	77.5	......
Indianapolis	16	86	11	41	62.7	......	6, 23	91	27	63	74.8	......
Rensselaer	16	84	6	38	61.4	2.95	24	94	10	52	74.1	6.80
Farmers' Institute	17	87	10	41	62.2	4.13	4, 17, 24	86	26	58	73.0	4.45
New Harmony	16	87	1	44	66.6	5.98	5, 6, 7, 24	91	26	67	78.2	3.29
ILLINOIS.												
Chicago	31	88	1	30	52.4	......	6	97	10	46	67.8	......
Evanston	16	84	2	34	54.9	1.75	6	92	10	48	60.9	3.71
Marengo	......	......	......	......	......	......	26	86	6, 8, 10	48	60.0	4.67
Riley	[illegible]	85	10	34	53.3	1.61	3	92	25	52	66.0	8.15
Sandwich		85	10	[illegible]	60.1	0.97	5	94	10	53	71.7	5.31
Ottawa	......	......	......	......	......	......	5	95	10	53	73.9	5.17
Winnebago	30, [illegible]	[illegible]	1, 11	[illegible]	60.3	1.56	6	90	26	51	71.4	4.46
Wyanet	[illegible]	[illegible]	11	[illegible]	60.4	1.35	5, 6	90	11	49	71.6	4.47
[illegible]	[illegible]	[illegible]	1, 10, 11	[illegible]	59.5	......	5	92	26	56	71.9	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	63.4	2.56	5, 6	92	26	57	73.7	3.38
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	......	......	6	91	11	50	71.0	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	63.8	2.34	5, 6	92	26, 27	61	75.1	1.86
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	63.8	2.46	5	94	21	59	74.9	6.04
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	68.3	......	24	94	26, 29	60	76.5	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	......	......	24	93	26	55	71.8	3.50
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	......	......	17, 24	90	26	57	74.2	2.65
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	64.6	1.50	23, 24	95	25	56	74.9	3.29
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60.5	1.58	4, 5, 6	87	10	58	71.4	3.94
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	63.2	0.70	4, 5, 6	89	26	57	73.6	6.77
[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.1	0.27	2	92	10	44	63.2	4.09
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.3	1.36	6	93	10	47	67.7	3.22
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.3	0.88	4	92	26	51	68.0	4.70
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.2	......	6	87	10	49	67.0	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.[illegible]	5, 6	90	30, 26	53	69.3	4.55

Meteorology of 1865—Continued.

n States and rritories.	MAY.						JUNE.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
SIN—Con'd.												
		Deg.		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
eca	30	93	10	38	61.2	......	4	94	10	52	71.6	......
ass	31	100	10, 11	28	60.8	2.85	2	100	27	42	67.5	5.92
wega	30	92	11	34	60.7	0.89	2	94	9, 26	52	71.2	2.70
Run	30	90	10	39	60.1	1.22	4	91	20, 26	52	70.2	5.23
o	30, 31	90	10	32	60.1	0.25	2, 3, 4	91	26	48	70.6	7.75
	31	87	1	35	59.2	0.73	4, 5, 6	89	26	49	68.6	3.8[illegible]
ith	......	......	......	......	......	......	2, 4, 5	95	26	45	68.1	3.20
1	......	......	......	......	......	......	3	88	9, 10	44	58.7	......
NESOTA.												
Bay	30	84	3, 9	35	51.6	2.79	11	90	10	43	55.8	3.08
	28, 29	90	10	34	56.4	......	2	94	20	46	68.6	......
l	28	87	2, 10	35	58.9	4.20	2	92	20	46	67.1	6.72
polis	30	91	2	35	60.9	......	2	95	20	59	70.4	......
	28	96	10	29	61.4	3.73	2	94	21	48	71.8	3.65
ha	30	92	12	38	62.1	6.13	3, 5	96	20	47	72.5	3.88
IOWA.												
	28	85	11	40	62.0	1.55	3, 5, 6	92	20	86	73.1	6.11
ne	28	87	1, 10	41	62.0	1.19	4, 5	91	10, 21	57	71.3	8.78
ine	23	86	1	37	57.1	1.05	5, 17	91	26	54	72.5	3.69
adison	28	88	13	40	63.4	1.22	5, 6	92	10	60	75.2	6.61
ello	28	91	10	37	59.9	0.84	3, 4, 5	90	20	54	69.0	9.02
berg	30	84	10	39	59.7	......	4	89	20	57	69.2	......
Vernon	20	88	12	32	61.8	......	3, 4, 6	91	25	53	71.0	......
ity	27, 28	86	11	32	61.4	2.72	6	88	26	54	74.9	6.96
ndence	28, 30	89	10	33	60.0	2.50	3	94	......	......	68.4	3.03
it Plain	......	......	......	......	......	......	3, 6	94	26	55	76.5	5.63
oo	28	87	7	22	63.0	......	3	90	1	54	69.0	......
ails	20	84	13	30	50.9	3.77	3	86	21	50	67.0	16.09
	30	90	10	31	59.4	1.63	4	94	21	42	68.0	6.06
ort	......	......	......	......	......	......	5	88	26	58	72.0	3.43
SSOURI.												
is	20	88	10	47	66.8	5.66	24	96	26	63	77.5	5.21
is University	21	88	11	51	68.5	3.81	24	95	26	67	78.9	4.40
n	20	92	11	41	64.0	4.63	28	93	26	58	73.0	4.57
	13	81	5	49	66.5	1.81	13	81	5	49	66.5	1.81
	4	93	2	42	63.0	0.71	6	96	20	56	74.8	5.01
nville	21	88	11	36	65.6	4.82	6	90	25	60	76.1	11.86
	21, 29	90	10	39	68.5	1.10	4, 5	92	25	61	......	8.40
ANSAS.												
	4	91	11	32	......	11.25	14	94	25	56	......	15.80
n	4	94	11	30	62.8	......	3, 21	96	26	57	73.4	......
gr. College	4	90	10, 11	32	68.2	2.04	4, 5, 28	90	25	59	76.1	7.98
ley	4, 20	95	10	34	68.0	1.10	23	97	10, 17, 18	63	76.0	5.47
BRASKA.												
n	29	90	10	37	63.2	......	4	96	18	56	71.7	......
e	3	87	10	39	61.2	1.45	5	92	20	57	73.7	5.05
y Hill	4, 21, 29	91	11	32	63.8	2.94	......	......	......	......	......	......
TAH.												
alt Lake City	27, 29, 31	88	1	38	68.2	2.60	20, 25	90	17	45	70.4	7.00
rge	6, 26	101	1	58	80.9	0.00	21	107	17	68	85.3	0.01
y's	......	......	......	......	......	......	26	100	17	31	63.1	......
IFORNIA.												
ancisco	5	84	1, 2	49	58.7	0.42	19	81	3, 9, 10	51	59.0	0.00
ento	7	97	24, 31	57	70.2	......	24	94	2	57	71.1	0.00
y	7	85	23	50	59.7	0.31	18	89	2, 5	53	57.0	0.00
v Valley	......	......	......	......	......	......	30	105	1, 2	44	65.9	0.25
HINGTON.												
Bay	6, 7, 9	64	26	41	50.8	6.70	......	......	......	......	......	......
IZONA.												
hipple	26	98	11	42	70.5	......	21, 22	110	4, 5	52	75.7	......

Meteorology of 1865—**Continued.**

Places in States and Territories.	JULY.						AUGUST.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
MAINE.												
		Deg.		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
Steuben	24	82	7, 8, 14, 15	54	62.5	5.30	2, 14	78	29	48	64.1	0.70
Lee	25	85	31	48	65.8	4.92	4	89	30	46	65.2	3.25
West Waterville	28	86	31	54	67.5	5.55	4	91	24	50	67.4	1.00
Gardiner	24, 24, 25	80	31	57	67.6	4.61	4	86	29	50	66.1	1.46
Lisbon	......	......	......	......	......	4.12	4	90	......	......	......	2.31
Standish	25	92	31	54	66.5	3.68	4	94	24	53	69.1	2.07
Cornish	25, 28	87	15	53	60.3	3.00	3	93	24	48	67.0	4.90
Cornishville	28	87	5, 14	56	69.0	5.00	3, 4	90	24	52	68.9	4.37
NEW HAMPSHIRE.												
Stratford	28	83	15	49	62.7	5.42	3	89	18, 23, 24, 29	46	62.5	1.68
North Barnstead	28	87	13	57	69.7	2.73	4	94	23, 24	52	70.1	2.52
Claremont	28	85	31	52	68.0	3.72	3, 4	92	29	44	68.0	1.47
VERMONT.												
Lunenburg	31	85	8, 9, 10	40	60.8	3.92	3	95	14	48	70.8	1.00
Craftsbury	28	78	14, 31	50	61.4	5.95	3	84	24	44	61.9	3.25
Middlebury	2	82	31	55	67.1	5.13	3, 4	82	29	50	67.6	2.54
Brandon	28	88	14	54	68.1	4.16	3	93	24	49	68.2	1.51
MASSACHUSETTS.												
Topsfield	28	87	11	57	70.7	2.62	4	92	25	50	68.8	1.45
Georgetown	25	87	11, 22, 31	57	69.7	......	4	97	24	53	68.9	......
Newbury	25, 28	91	9	56	70.0	......	4	95	24	47	68.5	......
New Bedford	7	87	14	60	71.5	5.14	3	84	24	53	70.0	1.16
Worcester	7, 28, 29	83	22	45	70.4	3.37	4	89	29	50	69.4	3.30
Mendon	29	88	14	57	71.1	2.70	4	91	24, 25	51	70.0	2.30
Baldwinsville	28	82	13, 15	54	67.5	1.75	4	88	24	46	61.9	3.45
Amherst	7, 28	85	15	55	69.1	3.72	4	90	24, 29	48	68.6	1.66
Springfield	28	93	15	47	69.6	3.86	4	98	24, 29	44	70.0	1.67
Westfield	28	85	10, 14, 15	54	68.7	3.55	4	89	24, 25	52	68.7	1.30
Richmond	......	......	......	......	......	......	2, 3	90	24	46	72.1	0.70
Williams' College	29	84	14	53	66.0	4.83	4	85	29	46	66.8	0.65
CONNECTICUT.												
Pomfret	7	83	11	56	......	5.72	4	85	23	50	67.0	0.97
Columbia	28	89	13	60	73.5	......	4	91	29	50	72.2	......
Middletown	7	91	11, 15	60	72.0	4.65	3	91	23	35	70.6	1.85
Colebrook	28	88	13, 14, 15	54	68.5	......	3	89	29	49	68.3	......
NEW YORK.												
Moriches	7	95	14	62	75.6	3.69	9	93	24, 25	58	73.2	1.50
South Hartford	8, 28	86	15	56	72.7	4.56	4	92	23, 24, 29	51	72.6	0.95
[illegible]lbany	7	88	10	62	73.1	3.98	4	89	24	54	73.5	1.37
[illegible]ishkill Landing	7	90	14	57	71.4	4.54	2, 3	88	23	50	71.4	1.76
[illegible]arrison's	[illegible]	90	11, 14	58	73.4	5.04	3, 4	90	22	52	62.8	1.30
[illegible]hrog's Neck		92	1	47	73.1	......	......	......	......	......	......	......
[illegible]eaf & Dumb Inst.	[illegible]	[illegible]	11	[illegible]	78.3	5.21	3	94	24	57	76.8	2.23
[illegible]latbush		91	[illegible] 19	[illegible]	71.5	3.54	3	85	24	54	75.3	2.90
[illegible]wburgh		[illegible]	[illegible]	[illegible]	75.2	4.10	4	92	23, 24	51	71.4	1.39
[illegible]erneur		[illegible]		[illegible]	66.2	1.85	3	91	28	40	66.0	0.99
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	66.9	5.77	4	89	29	42	64.9	1.22
[illegible]	[illegible]	[illegible]	1	[illegible]	66.6	6.21	31	90	29	42	66.8	1.52
[illegible]herburne	[illegible]	[illegible]	[illegible]	[illegible]	65.1	......	31	93	29	39	65.4	......
[illegible]ousevill[illegible]		[illegible]			......	......	3	89	23	49	65.6	1.20
[illegible]		[illegible]		[illegible]	65.5	2.71	3	88	28	48	66.5	1.22
[illegible]	[illegible]	[illegible]		[illegible]	67.7	......	3	87	23, 24	50	67.5	......
[illegible]swe[illegible]	[illegible]	[illegible]		[illegible]	65.2	2.35	31	86	29	48	66.3	1.11
[illegible]aler[illegible]	[illegible]	[illegible]		[illegible]	65.9	3.00	6, 2[illegible]	90	29	47	66.6	1.10
[illegible]aldwin[illegible]	[illegible]	[illegible]		[illegible]	61.8	......	31	84	29	45	65.0	......
[illegible]				[illegible]	63.9	......	31	88	23	48	67.3	......
[illegible]	[illegible]			[illegible]	70.8	......	3, 4, 31	90	23, 24, 29	50	72.1	......
[illegible]				[illegible]	68.9	......	3	92	24	46	67.2	......
[illegible]	[illegible]			[illegible]	67.5	......	3	92	29	48	66.5	......
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]2.0	2.90	3	87	23, 24, 29	52	68.4	1.94
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]8.4	1.47	3	93	23, 28	50	68.0	1.04
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]8.6	1.47	3	91	23, 24, 29	50	67.9	1.01
[illegible]uffa[illegible]	[illegible]				[illegible]	1.67	30	88	28	49	68.6	0.89
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	31	92	22, 24	48	66.8	2.30

Meteorology of 1865—Continued.

States and [Terri]tories.	JULY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	AUGUST. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
ERSEY.												
		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
....	7	93	14	58	74.6	9.92	4	92	24	50	71.3	2.20
....	7	92	14	54	72.5	6.74	3	88	24	50	69.8	3.94
nswick ...	28	97	14	56	74.1	......	5	97	24	48	71.5	......
n	7	93	15	60	73.7	1.80	4	90	24	55	69.9	3.30
wn	7	94	10	61	74.4	3.11	4	95	22, 23	54	71.8	3.41
olly	7	91	15	60	73.9	......	4	88	23	54	70.7	......
....	7, 29	96	14	52	72.4	4.05	3	89	24	55	73.0	3.20
eld	7	93	14	60	74.7	1.95	5	88	24	54	72.6	5.96
h	7	90	14	61	74.9	2.55	4	85	24	54	71.3	3.19
LVANIA.												
....	28	88	30	47	65.9	4.20	4, 5	88	24	41	65.7	4.80
n	7, 28	90	15	61	72.7	2.30	4	90	22	55	71.7	2.00
hia	7	97	14	64	78.3	2.14	3, 4	90	23	59	75.9	2.99
wn	7	98	10, 14	60	75.8	......	3	95	24	51	72.1	......
d	7	91	10	59	72.4	6.00	4	88	24	54	70.2	2.98
....	7	86	14, 15	45	63.9	......	4	84	25	39	62.0	......
....	28	98	13	55	73.0	......	4	92	24	49	70.8	......
hitehall ...	7	90	14, 15	52	71.7	......	3, 4	88	25	47	69.5	......
....	7	92	14	58	73.9	5.58	3, 4, 5	86	24	53	71.3	1.91
ring	7	94	13, 14	57	74.0	......	4, 5	90	24	52	70.8	......
y	7	98	14	66	79.2	6.10	6	96	24	56	76.6	0.80
g	7	94	14	63	77.5	2.69	5	89	25	57	75.0	3.53
g	7	94	13	52	71.5	3.79	4	88	24, 25	50	68.8	2.12
....	7, 8, 27, 28	90	14	50	69.8	7.95	2, 3	92	23, 24	46	67.1	3.34
....	8	93	14	40	69.3	5.36	6, 31	86	23	47	67.9	2.71
e	6	90	19	49	67.4	5.11	2	90	25, 26	44	65.2	3.37
ille	6, 7	92	13	50	71.4	......	2, 3, 31	88	21	48	69.1	......
rg	7	90	14	46	68.7	5.61	4	87	25	42	68.1	4.20
WARE.												
on	7	96	14	58	73.7	5.70	21	88	24	51	73.1	3.60
LAND.												
n	7	94	10, 14	62	75.2	6.96	4	90	23	56	72.6	1.51
....	7	96	14	61	78.2	8.75	21	88	23	56	75.3	3.86
s	......	......	......	......	......	......	4	96	23	59	76.6	3.55
....	21	88	14	57	73.7	3.70	4, 6	85	23, 24	57	71.1	3.25
RGINIA.												
H	5, 6, 7	92	14	58	75.4	5.70	3	88	25	48	70.1	2.10
AS.												
....	21, 23, 24, 25, 26, 29	95	6	75	84.0	0.23	17	106	26, 28, 31	75	85.1	0.00
SIPPI.												
....	22	92	14	70	82.7	2.33	15	91	1	68	80.6	1.91
SSEE.												
s	7	89	17	63	75.7	5.14	29, 30	89	25	58	74.3	4.92
JCKY.												
....	4, 7	95	18	53	74.5	6.92	30	92	25	50	73.5	3.68
f	6	93	17	61	75.0	5.05	3, 29, 30	88	24	56	72.8	4.69
....	4, 6, 7	96	17	69	76.2	6.73	4	93	23	57	74.5	1.68
....	7	95	18	59	76.6	......	......	......	......	......	......	......
IO.												
....	6	89	14	51	68.0	......	31	85	25	50	67.3	......
g	6	90	13, 14	53	70.0	5.30	9	87	25	46	67.0	0.75
......	4, 6, 7	98	14, 17	60	......	3.70	31	95	24, 25	48	73.3	2.79
......	......	......	......	......	......	......	......	88	......	[illegible]	71.0	3.60
....	6	88	14	54	69.4	7.42	4	90	23	50	68.7	2.89

Meteorology of 1865—**Continued.**

Places in States and Territories.	JULY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	AUGUST. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
OHIO—Continued.												
Milnersville	7	95	14	45	......	3.90	4	94	25	44	68.1	2.62
Cleveland	25	91	10	54	73.6	3.57	6	92	30	50	69.8	3.45
Wooster	6, 7	94	13	54	71.8	......	30, 31	90	24	49	69.9	......
Gallipolis	5, 7, 8, 28	94	15	51	73.4	6.30	3	93	25	46	70.5	2.48
Kelley's Island	6	90	13	58	71.5	4.54	31	90	24	59	71.9	1.75
Norwalk	6, 7	90	16	52	68.9	4.77	30	90	24	50	71.0	2.55
Kingston	4	93	17	58	72.4	4.86	31	93	22, 24	54	72.4	2.41
Portsmouth	4	95	15	61	76.3	3.70	10	84	25	55	72.5	1.47
Toledo	6	94	14, 16	55	69.3	6.06	3	90	25	53	68.8	3.75
Marion	6, 7	92	13	55	70.0	4.91	3, 21	86	23	51	68.4	2.11
Urbana University	5	94	14	54	71.8	4.62	3	88	23, 24	50	69.7	6.66
Hillsborough	6, 7	90	14	55	72.0	7.37	31	85	23, 24, 25	52	69.7	2.32
Ripley	7	97	14	60	77.7	6.16	31	93	23	56	74.6	4.32
Bethel	6, 7, 8	93	13	55	72.9	6.38	30	92	23, 24	50	71.0	3.38
Eaton	6, 7	90	16	57	71.5	6.91	......	......	......	......	......	......
Cincinnati	7	97	14	62	77.2	8.01	30	92	25	58	76.6	2.98
Farmers' College	4, 5, 6, 7	90	17	60	74.9	6.88	29, 30	87	25	54	73.2	5.80
College Hill	4, 5	94	16, 17	57	75.0	8.00	3, 4	92	24, 25, 26	53	74.0	3.50
MICHIGAN.												
Pontiac	6	87	13	50	66.3	......	31	92	24	42	67.7	......
Monroe	6	90	16	52	68.1	4.95	3	89	23, 25	50	68.4	4.60
Manchester	6	92	31	48	......	......	2, 3, 31	92	24	40	67.8	......
State Agr. College	6	87	13	50	65.7	3.91	2	86	22, 24	48	65.9	3.38
Grand Rapids	31	86	13	58	......	......	......	......	......	......	......	......
Homestead	6	83	29	48	64.6	......	2	86	23	42	65.0	......
INDIANA.												
Vevay	4	100	18	58	77.8	4.70	30	95	23, 24, 25	58	74.8	1.98
Pennville	5	97	16	52	69.7	......	2, 3, 4	88	23	47	70.2	......
Richmond	5, 7	90	13, 16	56	70.9	7.93	2	86	23, 24, 25	54	69.1	7.92
Spiceland	5	95	16	55	72.0	9.20	3, 30	91	22, 23	54	71.0	1.70
Madison	......	......	......	......	......	......	30	99	25	57	74.1	......
New Albany	7	95	17	58	76.0	5.37	30	91	24	57	75.6	3.31
Indianapolis	4, 5	93	3, 13, 15, 16, 17	60	72.6	......	3	92	24	55	71.4	......
Rensselaer	5	96	13	48	69.3	8.15	3, 29	91	23	49	70.7	9.41
Farmers' Institute	6	90	13	50	69.3	6.75	29	85	22	53	65.3	6.44
Bloomingdale	7	96	17	58	71.2	......	......	......	......	......	......	......
New Harmony	6	95	17	63	76.3	5.16	30	90	25	60	75.4	3.56
ILLINOIS.												
Chicago	6	92	12, 13, 17	52	65.9	......	2, 29, 30	88	17, 24	50	66.5	......
Evanston	6	88	13	54	66.5	3.44	18	88	24, 25	58	72.9	5.84
Marengo	4, 5, 6	90	16	50	66.1	3.78	......	......	......	......	......	......
Riley	[illegible]	90	12	50	66.0	7.84	29	86	24	55	70.3	9.15
Sandwich	[illegible]	[illegible]	12, 16	53	68.3	3.84	27, 28, 30, 31	90	22, 24	50	69.5	7.38
Ottawa	[illegible]	[illegible]	16	48	70.2	5.01	29	92	22	49	70.9	3.53
Winnebago	[illegible]	[illegible]	13	53	67.8	6.17	31	89	16	51	69.8	7.22
Wyan[illegible]	[illegible]	[illegible]	14, 17	[illegible]	68.1	6.96	31	91	23	50	70.9	6.79
[illegible]	[illegible]	[illegible]	13	[illegible]	69.8	......	9, 19	90	23	52	70.9	7.75
Elmira	[illegible]	[illegible]	13	[illegible]	70.2	4.32	29, 31	88	23, 24	54	71.4	5.65
Henne[illegible]	[illegible]	[illegible]	......	[illegible]	......	......	31	87	23	48	69.1	......
Peoria	[illegible]	[illegible]	13, 14	[illegible]	71.2	5.77	30	89	23	57	73.2	3.61
[illegible]	[illegible]	[illegible]	17	[illegible]	[illegible]	5.93	30	91	23	53	73.4	1.49
Spring[illegible]	[illegible]	[illegible]	14, 17	[illegible]	[illegible]	......	10, 30	94	24	52	74.7	......
Water[illegible]	[illegible]	[illegible]	16	[illegible]	77.[illegible]	......	5	98	23	67	80.2	......
Dubois	[illegible]	[illegible]	17	[illegible]	69.[illegible]	6.00	29	92	23	46	67.0	3.75
[illegible]	[illegible]	[illegible]	17	[illegible]	71.[illegible]	6.70	1	89	23	53	72.6	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.98	9	92	22, 24	58	74.4	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.74	9, 29, 30	88	13	49	71.4	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.59	9	89	23	54	72.0	1.63
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.16	18	84	11, 22	50	65.3	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.08	31	90	24	53	......	5.63
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.17	2	89	17	47	65.0	2.19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	88	16, 22	52	67.0	......

Meteorology of 1865—Continued.

tates and ories.	JULY.						AUGUST					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
s—Con'd.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
....	4, 5, 6	87	12	48	65.6	2.54	2, 31	85	23	48	67.7	4.97
a..........	8, 11	90	21	52	69.5	......	26	88	22	52	70.5	......
s..........	11, 31	90	13, 14	42	64.7	7.80	......	......	......	......	......	......
ga	3, 6	87	5, 12, 21	54	67.4	11.72	26	89	12	53	68.9	7.10
n........	4, 6	87	13, 15, 16, 21	54	66.2	3.78	28, 29, 30, 31	88	22	49	68.4	......
....	5	90	21	54	70.2	7.25	29	90	22	48	69.7	......
....	4, 6	90	13	52	67.1	3.00	31	86	24	52	68.2	4.00
....	6	91	13	45	64.9	3.30	31	93	22, 23	48	66.4	6.00
....	3	86	4, 12, 13, 15, 21	50	65.4	......	30	88	22	58	64.9	5.06
SOTA.												
ay	17	88	5, 13	48	62.1	1.53	30	85	21, 22	48	63.1	4.47
....	5	88	1	51	67.2	......	29, 30	90	22	50	68.1	......
....	5	84	1	51	66.4	2.55	30	85	22	52	66.7	9.16
'is........	5	88	1	52	68.1	......	30	91	22	53	69.2	......
y........	5	87	29	54	67.3	3.82	7, 8	86	22	54	68.0	6.66
....	4, 5	92	29	55	70.2	5.03	30	89	23	51	71.3	6.06
....	5	96	28	58	72.0	5.13	29	92	22	56	73.4	4.50
VA.												
....	5	93	13	54	70.5	7.42	31	91	23	47	72.9	10.55
....	5	92	15	55	68.7	2.98	28, 31	90	23	52	71.9	3.99
....	5	93	13	53	69.3	4.50	28	88	23	46	70.2	4.25
son	3, 7	94	15	57	74.0	9.93	9	95	23	49	73.1	2.03
....	5, 6	91	13	51	66.6	4.35	28, 31	88	23	51	68.9	2.78
g........	4, 5	87	15	55	69.5	......	28, 31	88	22	52	69.0	......
....	4, 5, 6	88	15	53	67.8	......	31	90	22	54	70.3	......
rnon	5, 6	90	13	52	68.1	......	27, 28	89	23	50	70.6	......
....	5	91	17	55	69.3	7.30	10, 30	90	22	55	72.4	1.35
nce......	5	93	10	50	69.3	4.20	28, 31	92	23	52	71.7	4.30
Plain......	4, 6	96	11, 14, 15	56	71.2	15.00	9	95	22	55	74.1	3.00
....	4, 5, 6	88	15	50	66.6	......	27, 28	90	24	52	70.3	......
s	5	86	10	50	66.3	7.45	9	89	24	50	71.7	2.81
....	4	92	15	52	67.6	2.63	......	......	......	......	......	......
t	4, 5, 6	89	13	52	68.0	5.41	28, 30	86	22, 23	56	71.2	4.52
s........	......	......	......	......	......	......	9	94	23	56	73.2	......
OURI.												
....	5, 6	97	14	61	75.4	7.94	30	93	23	57	75.9	1.96
University	5	97	14	61	76.2	6.26	30	92	23, 24	61	76.9	1.84
....	3, 4	96	17	53	71.8	9.26	......	......	......	......	......	......
....	......	......	......	......	......	......	31	93	9	57	71.1	1.45
....	5, 7	97	15	56	72.8	8.54	31	94	23, 24	57	78.4	2.06
ille	6, 7, 8	92	16	58	74.5	10.66	14	95	23	60	75.8	6.45
....	3	95	16	58	74.6	8.66	28	92	23	61	75.8	8.07
SAS.												
....	7	96	16	57	......	13.75	28	96	23	58	70.5	13.10
....	4	98	17	53	75.3	......	10, 16, 17	100	22	59	76.2	......
College .	3, 5, 6	93	17	50	75.7	6.42	30, 31	90	24	59	75.4	5.04
....	6	96	16	60	77.0	2.80	20, 21, 28, 29	94	22	65	75.5	......
ASKA.												
....	5	94	16	56	70.9	......	27, 28, 30, 31	90	3, 22	60	72.8	......
....	3, 4	93	11, 16	60	75.2	3.72	......	......	......	......	......	......
....	31	96	16, 17, 21, 22	58	......	6.50	26	94	23	54	74.2	1.50
H.												
Lake City	......	......	......	......	......	......	25	95	30	63	77.0	......
....	1	108	16	65	83.3	1.03	26	103	16	74	87.7	0.22
....	1, 12, 15	92	27, 28	......	66.8	......	6	91	[illegible]	44	70.1	......
RNIA.												
isco	20	80	5, 6, 7	53	55.7	0.00	23	71	5	51	57.8	0.00

Meteorology of 1865—Continued.

Places in States and Territories.	JULY. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	AUGUST. Date.	Max. temp.	Date.	Min. temp.	Mean temp.
CALIFORNIA—Continued.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	De
Sacramento	21	94	6, 8	61	74.0	0.00	23, 24 25, 27	88	17	60	71.
Monterey	20	81	7, 17, 23	54	61.6	0.10	23	74	19	53	61.
Meadow Valley	27, 28	102	8, 10, 13, 17	50	71.4	0.00	2	96	31	46	67.
Nevada City	28	84	11, 12	62	74.0	......	20	80	29	64	71.
WASHINGTON.											
Neeah Bay	13	71	2, 3, 4, 6	48	55.7	0.30	16, 19	67	12, 24	48	56.
ARIZONA.											
Fort Whipple	1	105	14	42	70.9	......	......	......	......	......	....

Places in States and Territories.	SEPTEMBER. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	OCTOBER. Date.	Max. temp.	Date.	Min. temp.	Mean temp.
MAINE.											
Steuben	1, 12	84	23	38	59.5	1.05	1	65	30	25	43.
Lee	14	84	27	34	59.8	2.75	1	66	27	17	43.
West Waterville	14	86	28	40	63.8	0.57	1	70	31	22	41.
Gardiner	1	83	27	39	62.0	0.84	1	69	25	25	44.
Standish	1	96	18	42	65.7	1.26	2	76	24, 27	26	41.
Cornish	1	89	27	35	63.4	1.70	1	68	24, 25	23	42.
Cornishville	1	88	18	41	65.4	1.58	1	70	27	25	43.
NEW HAMPSHIRE.											
Stratford	5	82	27	30	58.7	1.51	1	63	25	18	38
Shelburne	5	94	27, 29	36	52.1	......	1	70	31	18	42
North Barnstead	3	91	18	40	68.2	1.76	1	75	27	26	45
Concord	1, 5	88	28	39	66.2	......	1	70	25	22	45
Claremont	1	90	27	39	65.1	3.38	1	70	24	23	44
VERMONT.											
Lunenburg	1, 13	90	27	30	56.4	4.63	19	65	26	16	37
Craftsbury	14	85	19, 27	34	59.1	1.87	1, 19	58	25, 27	22	38
Middlebury	5	82	27	36	63.5	2.66	1	64	25	25	43
Brandon	3, 6	90	27	37	64.9	2.17	1	68	24	24	44
MASSACHUSETTS.											
[illegible]opsfield		90	28	43	65.7	0.40	1	74	24	29	48
[illegible]eorgetown		93	27	45	65.2	......	1	76	30	27	46
[illegible]ewbury		92	18, 27, 28	43	64.9	......	1	71	25	29	46
[illegible]ambridge		......	......	......	......	......	1	74	24	26	46
[illegible]ew Bedford		[illegible]	27	48	67.4	0.25	10	78	30	33	51
[illegible]orcester		[illegible]	18	45	66.0	0.68	1	71	30	29	47
[illegible]endon		[illegible]	18	44	66.5	0.60	1	73	23, 30	28	48
[illegible]winsville			......	......	......	......	1	67	25	23	...
[illegible]erst		[illegible]	[illegible]	[illegible]	65.6	0.37	1	72	24	24	40
[illegible]ringfield		[illegible]	[illegible]	[illegible]	67.0	0.65	10	78	24, 25	25	47
[illegible]field		[illegible]	[illegible]	[illegible]	65.3	0.86	10	72	14, 25	27	43
[illegible]			[illegible]	[illegible]	68.3	2.44	......	......	......	......	...
[illegible]		[illegible]	[illegible]	[illegible]	63.7	2.27	7	70	24	25	44
[illegible]					......	......	10	76	26	30	51
[illegible]					64.2	0.31	10	72	24, 25, 30	30	49
[illegible]amb[illegible]			[illegible]		68.5	......	1	82	24	30	5
[illegible]dlet[illegible]		[illegible]	[illegible]		68.[illegible]	0.75	10	82	26	27	5
[illegible]			[illegible]		[illegible]		10	74	30	25	4

Meteorology of 1865—Continued.

ates and ies.	SEPTEMBER.						OCTOBER.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
ORK.												
		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
....	15	95	29	51	71.9	3.53	10	85	14	33	55.9	4.06
ord	3	90	27	38	68.7	2.08	1	72	24, 25, 27	25	46.4	2.27
. ...	1	89	27	47	70.9	2.80	1	72	24, 27	35	50.9	4.59
ding ...	1	88	27	45	68.3	1.48	10	78	25	31	50.1	3.05
....	1	87	27	42	66.7	2.02	10	79	14, 25	32	50.3	4.64
k.......	15	89	18	45	68.3	......	8	74	25	33	50.4	......
umb Inst	1, 14	90	18, 19	51	72.7	4.21	10	83	25	39	54.0	4.94
ollege ..	......	......	......	......	......	......	10	76	25	35	51.2	3.16
....	6	88	19	45	67.8	2.21	10	80	25	34	51.3	5.75
....	1, 15	87	18	50	68.8	1.50	8	75	22	35	50.1	3.00
....	4, 5	88	27	33	63.0	2.36	10	61	25	20	42.4	3.22
ton	4	91	20	40	64.3	2.96	11	70	24, 25	24	43.7	4.78
....	3, 4	87	26	44	65.2	9.16	10	68	24	27	47.2	7.84
....	3	92	28	42	66.2	......	......	......	......	......	......	......
....	4	88	19, 26, 27	40	64.2	2.67	7	64	24, 25	20	41.5	4.36
....	3, 13	88	27	38	65.9	4.10	7	65	27	24	43.7	7.00
....	13	82	27	44	64.9	3.30	1	65	24, 25	30	47.2	6.32
....	4	93	26	40	64.7	4.20	1, 9	65	24, 25	20	42.8	5.60
le.......	4	84	28	41	64.9	......	10	65	25	27	43.7	......
....	3, 4	88	26, 27	43	66.4	......	10	68	25	26	44.6	......
....	1, 3, 4	90	27	43	69.2	......	11	78	25	26	50.0	......
....	4	92	28	44	66.7	......	10	80	24	24	45.6	......
....	14	87	27	43	67.1	......	......	......	......	......	......	......
....	4, 13, 17	85	26	48	68.0	4.86	10	71	24	29	47.0	3.43
....	13	88	27	44	67.2	4.33	10	69	21, 25	27	46.8	4.29
niver'y.	14	88	27	42	67.0	4.33	7, 10	69	25, 29	28	46.8	4.29
....	2, 12	91	19	41	63.0	3.29	11	69	24	26	47.8	3.00
....	17	89	19, 20	45	71.5	8.80	10, 11	78	24	27	47.5	1.30
SEY.												
....	1, 3	87	19	45	68.2	3.35	10	81	25	32	51.8	5.04
....	6	86	19	44	68.4	3.21	10	80	26	33	52.2	4.69
....	......	......	......	......	......	......	10	83	25, 26, 30	40	59.4	7.97
wick ...	13	92	19, 27	45	71.3	......	10	83	26	32	......	4.45
....	6	88	28	45	68.3	2.60	10	80	14, 25, 26, 30	32	51.2	4.50
....	6	90	19	51	69.7	3.25	2, 10	79	26, 30	34	51.8	4.23
y	6	85	19, 28	48	69.5	......	10	78	30	33	51.8	......
....	3	92	19, 27	52	72.3	4.80	9, 10	76	17	32	49.3	5.00
l	4	86	28	47	69.2	7.72	10	78	30	32	51.4	3.25
....	6	85	19, 28	49	70.4	3.59	10	78	30	35	52.9	2.52
ANIA.												
....	1	90	19, 26, 28	48	65.7	1.80	10	78	24	24	46.4	3.45
....	6	88	19	48	70.9	2.00	10	80	26	35	52.0	5.00
a........	4, 6	88	19	50	74.0	6.58	10	78	25	38	55.9	3.36
n	4, 6	91	19	47	70.1	......	......	......	......	......	......	......
....	6	87	19	45	68.6	4.65	10	80	30	31	51.1	4.25
....	1	83	27	32	60.5	......	10	76	25	19	43.0	......
....	6	90	18, 28	48	68.9	......	10	80	29	34	50.4	......
ehall ...	6	87	19	42	68.1	......	10	78	30	25	49.7	......
....	6	90	19	49	70.7	2.25	......	......	......	......	......	......
....	......	......	......	......	......	......	11	85	30	32	52.2	3.84
ng.......	1, 4	90	27	43	68.4	......	10	81	25	28	50.5	......
....	5, 13, 14	93	17	59	74.9	0.30	1	80	25	35	57.1	......
....	4, 6, 14	87	29	53	73.2	4.75	10	77	26	38	54.2	3.09
....	14	87	27	45	66.9	5.46	10	79	25	25	48.0	1.31
....	4	96	27, 28	44	71.3	3.94	10	78	22	24	49.8	2.65
....	5	87	30	39	67.8	5.09	11	76	5	22	46.3	2.56
....	5	87	20	42	67.0	6.19	10	75	22	26	46.5	3.12
e	11	88	19	48	70.0	......	10	76	30	24	49.0	......
'........	10, 12	87	29	44	68.9	4.60	10	74	30	23	47.0	3.07
ARE.												
....	3	88	28	49	69.6	6.95	10	80	30	34	51.3	4.00
ND.												
....	6	91	28	49	71.5	1.07	10	83	30	34	53.3	4.01
....	6	92	20, 28	52	74.3	3.79	10	81	30	32	50.7	4.16
....	7	94	19, 29	57	75.7	0.62	10, 11	82	30	40	57.9	3.95
....	3	86	20	48	76.1	1.75	10	80	26, 30	31	51.6	3.00

Meteorology of 1865—Continued.

Places in States and Territories.	September.						October.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
WEST VIRGINIA.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
Cabell Court-House	27	92	20	56	73.3	3.10	10	80	29	32	54.3	0.90
TEXAS.												
Austin	15, 16	96	23, 30	72	82.2	8.62	12	90	30	42	66.9	3.32
MISSISSIPPI.												
Natchez	4, 8, 11, 12	86	19	65	77.4	5.17	26	82	19, 21, 29	40	63.6	1.77
TENNESSEE.												
Clarksville	11	88	19, 30	56	74.1	6.19	12	76	29	38	55.9	1.03
KENTUCKY.												
Louisville	5, 15	91	20	50	75.5	5.61	7	79	29	36	55.6	1.84
Chilesburg	11	90	20	55	73.3	7.17	8, 9, 10, 11	76	29	33	54.5	1.55
Danville	5, 9, 12, 13	92	30	56	74.7	3.75	9, 10	78	29	35	55.8	1.25
London	3, 21, 29	89	25	55	73.5	......	13	78	13, 30	36	56.5	......
OHIO.												
Saybrook	13	86	19	48	68.3	4.10	9	73	24, 25	31	49.4	2.00
Austinburg	13	91	19, 27	45	66.0	3.95	9	75	24	24	46.4	0.50
New Lisbon	4	95	27	42	70.0	6.75	9	76	30	26	49.6	1.15
East Fairfield	9	82	27, 29	51	68.0	5.74	10	70	22, 30	30	48.6	1.14
Steubenville	......	88	......	50	71.3	9.50	......	......	......	......	......	......
Welshfield	4, 13	88	19	48	70.7	9.84	9	76	29	32	48.1	[illegible]
Milnersville	13	88	29	46	69.0	4.47	10	76	30	25	......	[illegible]
East Cleveland	13	90	19	49	69.7	4.82	9	77	21, 30	33	51.2	[illegible]
Wooster	14	88	27	52	71.3	......	9	78	30	28	49.8	......
Gallipolis	11, 13	89	20	48	71.3	5.42	10	76	30	29	52.0	1.71
Kelley's Island	10, 17	88	19	57	73.0	8.23	7, 9	74	28, 29	38	53.5	3.11
Norwalk	10, 13	88	27	48	69.7	5.30	9	75	29, 30	30	48.6	[illegible]
Westerville	16	89	18	52	69.4	5.65	9	80	30	28	47.2	0.83
Kingston	17	92	19, 27	54	73.9	5.51	9	81	30	31	52.2	0.92
Toledo	4	90	19	46	70.2	10.19	9	79	30	32	50.2	2.25
Marion	10	85	19	48	69.4	6.38	9	72	29, 30	30	47.7	1.41
Urbana University	5, 17	88	19	50	72.4	5.32	9	76	29	29	50.0	1.22
Hillsborough	10, 13	84	19	52	71.3	5.45	9	73	29	32	51.3	0.87
Ripley	13	92	19	54	75.9	3.92	9	81	30	31	55.4	0.82
Bethel	15	92	20	53	71.7	6.75	12	78	29	31	51.4	0.75
Cincinnati	12	95	19	50	75.3	5.76	10, 12	79	29	33	54.0	0.86
Farmers' School	......	......	......	......	......	......	2, 3	80	29, 30	32	53.0	0.80
College Hill	12	93	19	52	75.3	4.13	9	77	29	31	54.3	0.75
MICHIGAN.												
Monroe	10	88	18	51	69.6	5.05	9, 10, 11	72	22	31	48.3	[illegible]
State Agr. College	10	85	19	43	67.7	4.79	9	74	29, 30	29	46.5	2.79
Homestead	3	88	19	43	66.1	......	9	73	29	20	44.6	......
INDIANA.												
Vevay	12	99	19	51	77.2	6.51	10	96	27, 29	30	55.1	1.55
Richmond	9	88	30	49	71.1	5.37	8, 9	73	29	29	49.1	1.11
Spiceland	12	91	19	47	72.7	3.00	8	79	29	32	51.0	1.60
Madison	11	88	19	58	77.0	8.50	11	85	28	39	......	......
Columbia City	4	96	19, 30	50	75.3	6.69	9	91	30	28	51.0	2.38
New Albany	5	90	19, 20	53	74.3	6.85	9, 12	78	29	37	54.0	1.09
Indianapolis	12	91	19, 20	51	73.0	......	8	79	29	31	51.9	......
Rensselaer	4, 13	90	30	50	72.4	6.25	......	......	......	......	......	......
Farmers' Institute	4	95	30	50	70.8	6.75	11	73	28	30	55.2	1.75
New Harmony	9, 10	90	19, 30	57	76.5	5.26	11	77	29	37	56.3	1.38
ILLINOIS.												
Chicago	2	90	30	44	67.4	......	9	78	29	22	48.9	......
Evanston	3	87	30	50	73.7	3.32	9	77	29	25	51.0	2.45
[illegible]	3	87	20	47	68.5	3.34	9	77	29	23	47.0	[illegible]

Meteorology of 1865—Continued.

ates and ries.	SEPTEMBER.						OCTOBER.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
-Cont'd.		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
	3	92	19	45	70.4	5.72	7, 9, 10	75	29	22	49.4	1.48
	9	94	18, 30	48	72.1	3.89	7	81	28, 29	28	50.8	1.84
	3, 9, 14	89	30	46	70.2	9.09	7	78	29	17	48.2	3.53
	3	91	19, 30	48	71.6	11.57	9	82	29	25	52.6	2.90
	9	94	19	46	74.2	......	7, 8	78	29	26	51.4	......
	9	89	30	47	70.8	7.50	9	76	29	22	52.0	2.25
	......	......	......	......	......	......	7, 9	76	29	26	52.0	......
	4	89	30	52	73.4	8.31	7, 8	79	29	29	54.7	1.67
	4, 12	92	30	47	73.6	11.30	1	89	29	28	54.6	1.83
	4	95	19	52	72.9	......	1	84	28	32	51.6	......
	12	92	19	45	73.2	5.00	23	82	29	30	53.8	3.45
	12	92	19	50	73.4	4.20	8	81	29	28	54.9	2.10
le	4	94	29	45	73.7	5.83	8	80	29	26	55.2	2.25
	3	88	19	50	70.0	5.08	8	79	29	29	52.2	4.39
	2, 3, 12, 13	89	30	49	72.3	5.80	8	79	29	24	53.7	3.35
NSIN.												
	24	85	18, 19	49	66.6	4.83	9	79	29	30	48.0	3.33
	14	90	19	50	68.9	6.37	9	79	29	28	49.8	5.23
	3	89	18	44	66.1	5.87	......	......	......	......	......	......
	3, 14	87	29, 30	46	68.2	......	7	76	29	20	48.0	......
	3	86	30	45	67.8	6.09	9	75	29	17	46.5	2.52
	3	90	18	46	68.7	......	9, 10, 11	80	30	25	46.4	......
ga	22	92	30	47	69.2	8.63	10	79	30	22	46.7	5.50
	3	95	18, 30	42	66.4	3.27	9	82	29	20	45.4	3.28
1	3	87	18	46	67.3	4.20	10	78	29	.17	47.3	4.06
	3	85	19	62	70.9	......	......	......	......	......	......	......
	3	90	30	45	69.6	7.35	10	76	29	20	49.6	5.63
	3	86	30	45	68.0	5.23	7, 9	74	29	20	47.2	2.65
	3	88	18	48	67.1	11.30	9, 10	80	29	23	46.3	3.70
	......	......	......	......	......	......	6, 9	76	30, 31	26	43.7	......
SOTA.												
y	16	80	30	40	60.7	3.53	17	66	30	24	44.5	1.05
	1	88	18	45	65.4	......	......	......	......	......	......	......
	3	84	18	47	67.8	1.90	6	79	29, 30	22	47.0	2.30
s	3	88	30	47	68.4	......	6	86	30	19	47.6	2.65
r	9, 16	86	30	43	67.2	2.74	6	84	29	18	48.8	0.66
	2	88	30	40	68.9	8.01	6	86	29	18	49.4	4.52
	1, 2, 9	91	30	50	71.7	2.51	6	87	29	22	51.5	3.11
'A.												
	......	......	......	......	......	......	6	78	29	22	51.7	4.00
	14	82	18	54	74.5	7.00	6	78	29, 30	28	51.9	4.07
	3	88	30	52	69.8	3.68	7	75	29	25	49.3	2.67
	3	91	30	50	70.3	4.17	9	77	29	21	50.6	3.77
	3	92	19	44	70.8	4.28	8	77	29	22	50.4	3.63
on	2	91	19, 30	47	72.7	6.63	7	84	29	23	54.1	2.73
	14	94	30	44	73.1	5.62	......	......	......	......	......	......
g	9	88	30	46	......	......	9	78	29	16	47.6	......
	3	90	30	50	69.9	......	6	74	29	14	48.7	......
r	3	88	30	44	68.2	3.44	6	78	29	18	48.1	5.72
non	3	90	30	47	70.3	......	6, 8	78	29	24	50.5	......
	3	90	30	44	72.6	3.65	8, 10	82	29	25	53.9	6.35
nce	13	97	19	36	70.6	6.80	6	86	27	10	46.7	10.20
	2, 3, 11	88	28, 29	52	69.0	......	6	80	29	16	51.0	......
	2	86	19	50	74.5	2.87	5, 7	78	29	22	47.2	6.31
s	3	91	29, 30	48	70.7	2.75	6, 8	81	29	23	47.9	7.50
URI.												
	10	94	30	53	75.5	2.60	11	80	29	30	57.3	3.33
hiversity	8, 10, 12	92	19	54	76.7	2.83	8	80	29	34	58.8	3.11
	3, 4, 15	93	20	58	......	2.96	7	72	17	37	54.5	3.94
	2	97	19	51	74.0	7.42	7	87	29	21	55.8	3.96
	13	90	30	58	74.4	8.09	5, 6, 7, 8	80	29	26	56.6	0.72
	13	92	30	50	73.6	4.78	7	83	29	25	56.7	2.81

Meteorology of 1865—Continued.

Places in States and Territories.	SEPTEMBER.						OCTOBER.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
KANSAS.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
Olatha	14	93	29, 30	54	72.5	8.10	5	82	28	24	42.9	2.85
Atchison	13	97	30	40	73.6	......	5	86	29	20	55.5	......
State Agr. College	2	90	......	......	......	......	......	......	......	......	......	......
Fort Riley	3	95	30	52	75.3	1.00	......	......	......	......	......	......
NEBRASKA.												
Elkhorn	2, 8, 13	90	30	46	71.6	......	5	85	29	16	54.0	......
Bellevue	12	87	29, 30	59	72.9	1.31	6	80	28	20	55.7	3.32
UTAH.												
Great Salt Lake City	15	85	10	35	64.6	1.52	2	83	30	30	56.4	4.10
St. George	12, 16, 17	95	10	52	73.9	0.20	2	87	31	32	60.7	0.60
St. Mary's	12	84	29	28	59.6	......	1	78	30	17	46.8	......
NEVADA.												
Star City	......	......	......	......	......	......	5, 6, 7	72	24, 26, 28, 29	30	50.4	......
WASHINGTON.												
Neeah Bay	4, 20	62	12, 13	46	53.7	13.30	7	60	25	37	49.3	8.40
CALIFORNIA.												
San Francisco	4	87	12, 14, 16, 23	52	61.9	0.24	6	73	24, 29, 30	48	56.0	0.29
Sacramento	5	90	27	54	60.9	0.01	6	85	23	50	63.1	0.48
Monterey	4	92	13, 21	52	61.5	0.17	6	78	28	47	57.9	0.17
Meadow Valley	5	93	28	33	56.8	1.75	1	79	28	25	50.7	4.00

Places in States and Territories.	NOVEMBER.						DECEMBER.					
MAINE.												
Steuben	17	56	12	6	37.2	5.84	27	50	23	—11	24.2	4.90
Lee	17	60	12	—2	34.8	3.70	27	50	23	—15	22.1	5.35
West Waterville	17	61	12	8	36.4	3.40	13	46	22	— 6	24.1	3.25
Gardiner	17	65	12	10	37.1	3.24	13, 27	47	23	—10	24.4	3.23
Webster	......	......	......	......	......	......	27	47	23	— 1	23.8	......
Standish	17	70	8, 12, 29	20	38.2	3.74	27	55	22, 23	0	25.3	2.61
Cornish	17	68	12	15	37.1	7.98	27	52	22	— 3	24.4	2.72
Cornishville	17	67	11	16	37.9	3.72	27	54	22	— 2	25.7	3.84
NEW HAMPSHIRE.												
Stratford	17	58	12	2	33.1	1.67	27	49	22	—12	20.5	3.01
Shelburne	17	66	12	7	36.9	1.00	4, 25	47	23	— 1	25.5	1.43
North Barnstead	17	75	8	21	41.2	2.89	27	56	22	2	29.4	0.95
Concord	16, 17	69	12, 29	19	39.6	2.88	......	......	......	......	......	......
Claremont	17	70	12, 29	18	38.0	3.20	27	51	22	— 3	27.0	3.38
VERMONT.												
Lunenburg	13	58	9	14	34.6	2.95	4	48	22	—17	24.5	1.07
Craftsbury	17	61	8	11	32.9	2.22	27	42	16, 23	— 7	21.4	3.48
East Bethel	17	65	8	17	36.5	3.50	27	58	22	— 8	26.4	2.32
Middlebury	17	65	8, 29	22	38.3	3.03	4	45	22	0	27.2	2.46
Brandon	17	68	29	18	37.1	3.51	27	54	23	0	28.1	1.69
MASSACHUSETTS.												
Topsfield	17	72	11	23	44.3	3.74	27	61	23	11	34.3	3.00
Georgetown	17	71	29	18	49.5	......	27	62	22	1	29.3	1.65
Newbury	17	72	29	18	40.5	......	27	61	22	2	30.1	......
Cambridge	16, 17	67	12	20	40.8	......	27	59	9	2	30.0	0.83
New Bedford	14	65	8	23	45.3	4.33	3, 4	57	16	11	36.0	4.26
Worcester	17	69	11	20	41.8	2.36	27	59	9, 23	8	32.1	2.75
Mendon	16, 17	69	29	19	41.2	3.40	27	58	9	6	31.7	3.96
Baldwinsville	17	66	8	14	......	2.51	27	57	23	3	......	......

Meteorology of 1865—Continued.

States and itories.	NOVEMBER.						DECEMBER.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
HUSETTS—itinued.												
		Deg.		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
t	16, 17	68	8	19	39.9	2.45	27	60	23	7	28.9	3.54
eld	16	72	11, 29	17	40.1	2.64	27	53	22, 24	4	30.5	3.12
d..........	16	70	8, 11	19	40.2	3.10	27	63	22	4	29.9	3.03
ad..........	16	63	11	12	36.7	3.08	27	52	23	4	29.0	6.00
's College..	17	68	8	17	37.9	1.78	27	52	8, 16, 23	8	29.4	2.12
E ISLAND.												
t	17	61	11	23	43.7	4.69	4	55	15, 16	16	35.6	5.46
ECTICUT.												
....	16	68	29	18	40.6	2.64	27	54	22, 23	7	30.8	2.90
a..........	16	78	8, 11, 28, 29	28	43.5	......	3	61	22, 23	8	34.3	......
own	16	74	8, 11, 29	20	42.3	3.96	3, 27	55	22	10	33.5	2.99
ok	16	67	8	13	37.3	......	27	58	23	— 2	27.9	......
V YORK.												
s	16	67	8	24	46.5	4.34	3	61	16	14	38.9	5.96
artford	16	72	8	17	39.3	4.66	27	50	22	4	29.5	3.45
....	17	70	8	26	44.6	2.61	27	57	16	19	37.2	1.67
Landing ...	17	66	11	23	40.8	3.46	3	55	23	14	33.7	3.18
's	16	65	8	22	41.6	3.17	27	64	23	14	29.9	3.27
Neck.......	16, 18	64	8	22	42.9	......	3	56	16	13	34.0	......
d Dumb Inst	16	72	8	29	45.7	4.19	27	69	15, 16	21	38.9	6.30
ia College..	16	67	8	25	42.4	......	27	61	16, 23	16	34.5	3.94
h	16, 18	67	8	23	42.8	3.98	27	62	23	14	34.9	4.53
gh	16	70	11	24	42.1	3.10	27	62	23	12	34.2	3.50
eur	17	63	29	16	36.0	2.33	4	52	16	—12	25.1	2.50
Trenton	16	55	11, 13, 28, 29	20	34.9	2.42	27	55	16, 23	12	27.1	3.72
....	17	70	29	19	38.2	6.23	4	58	23	8	31.3	3.72
....	17	63	29	18	37.2	3.01	4	58	16	— 5	25.9	2.81
ille	16	62	29	20	37.3	5.30	4	56	16	2	27.7	4.35
....	17	66	29	23	40.0	2.84	4	57	16, 17	11	31.7	2.83
....	16	66	29	20	36.2	3.35	4	55	16	— 2	28.0	4.85
sville......	17	65	30	21	37.2	......	4	57	17	9	26.9	......
teles	17	66	28	21	38.1	......	......	......	......	......	......	......
....	17	66	11	22	39.8	......	4	60	14, 23, 31	10	32.2	......
....	17	73	12, 30	21	37.6	......	4	64	16	7	31.7	......
....	15	65	11	25	41.1	1.73	4	58	15, 16	14	32.2	1.08
er Univer'y.	16	65	8, 29	26	39.7	1.70	4	61	23	10	31.1	1.75
....	16	65	8	26	39.8	1.70	12	57	23	10	31.2	1.75
....	16	66	28	23	40.5	0.94	12	56	23	9	31.0	3.35
wn	15	73	7	22	38.7	......	25	60	16, 22	2	33.7	5.10
JERSEY.												
n..........	17	68	11	24	43.3	4.53	3	60	16, 23	16	35.6	5.00
....	16	70	8	24	43.2	3.30	27	62	23	14	35.3	4.39
unswick	16, 17	71	8	22	42.5	3.41	27	65	16	11	34.4	5.95
1	17	70	11, 12	30	49.8	3.64	27	62	16	16	38.0	......
ton	16	72	12	22	42.1	3.80	27	62	16	11	33.8	5.55
town	16	75	12	22	42.7	3.45	4	64	15, 23	14	35.1	5.77
Holly	16	68	8, 11, 12	26	43.8	......	27	63	16	14	36.6	......
field	16, 17	68	12	22	42.2	3.59	27	61	16	11	34.2	5.21
ich........	17	68	12	25	43.9	3.56	4	67	16	13	37.5	4.79
SYLVANIA.												
....	16	73	11	9	33.5	4.40	4	62	31	— 1	27.7	4.15
gton........	17	69	11, 12	25	43.7	3.10	27	63	16	15	35.7	5.20
lphia.......	17	66	11	27	45.2	3.60	27	63	16	18	37.7	5.68
ntown	17	67	11	22	42.8	4.24	27	62	16	9	33.6	5.73
nd..........	16	71	8, 11, 12	24	42.5	3.55	3	62	16, 23	11	34.3	3.30
y..........	17	67	11	12	34.5	......	27	55	23	— 2	26.4	......
th	16	68	11, 12	24	41.4	......	3, 12	58	16	9	33.6	......
Whitehall...	17	64	11	19	41.2	......	......	......	......	......	......	......
ville	17	69	12	21	42.7	2.35	4	65	31	10	34.5	4.78
a	16	70	12	23	46.3	4.70	3, 4	70	16	7	32.4	6.33
Spring......	17	71	11, 12	20	41.4	2.85	4	65	23	10	35.0	......
oy	17	75	12	23	46.1	......	4	65	16, 23	15	37.0	1.75
urg	16	67	12	27	44.6	1.77	4	55	16	16	34.2	3.50
urg........	17	72	11	17	38.7	2.48	4	57	16, 23	5	30.0	3.12

Meteorology of 1865—Continued.

Places in States and Territories.	November.						December.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp	Rain or melted snow.
PENNSYLVANIA—Continued.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
Tioga	16, 17	70	12	18	40.1	2.85	4	66	16, 22	4	31.3	0.51
Fleming	17	67	12	17	39.6	1.36	4	65	16	1	30.8	2.51
Pennsville	15, 16	65	11	18	37.2	2.07	4	60	16	2	28.7	3.57
Connellsville	17	67	12, 28	20	39.6	......	3	70	15	1	35.7	......
Canonsburg	17	66	11, 12	20	38.4	0.70	3, 4, 26	58	15	0	32.5	2.90
MARYLAND.												
Woodlawn	17	78	11	23	45.5	2.82	4	68	16	11	37.1	6.00
Annapolis	17	65	12	28	46.5	3.66	4	69	16	11	38.7	5.43
St. Inigoes	16, 17	71	8	33	48.1	5.55	4, 27	70	16	14	40.1	4.31
Frederick	......	......	......	......	......	......	4	66	16	1	34.0	4.10
Catonsville	......	......	......	......	......	......	27	59	16	10	33.1	......
DIST. OF COLUMBIA.												
Washington	17	72	12	27	46.1	2.22	4	69	16	12	38.3	5.29
WEST VIRGINIA.												
Cabell C. H.	3	78	16, 23	8	37.5	6.20	3, 4	69	23	5	40.1	......
Weston	16, 17	70	12	23	43.2	......	......	......	......	......	......	......
VIRGINIA.												
Wythesville	1, 16, 17	63	8, 28	21	41.4	......	3	64	15	8	39.0	......
GEORGIA.												
Atlanta	19	78	30	27	51.8	4.53	3	75	15	19	47.9	8.66
TEXAS.												
Austin	15	83	6	36	58.1	1.49	3	82	14	18	48.0	0.95
MISSISSIPPI.												
Natchez	16, 17	75	6	32	56.4	2.70	3, 4, 25, 26	76	14, 15	22	52.5	6.30
ARKANSAS.												
Helena	......	......	......	......	......	......	2	79	14	13	45.5	5.22
TENNESSEE.												
Clarksville	16	70	6	27	47.5	1.22	3	74	14	8	40.4	9.76
KENTUCKY.												
Louisville	16	67	27	22	45.1	1.25	3	72	14, 15	6	37.7	7.90
Chilesburg	16	70	6, 21	26	48.2	0.59	3	70	15	4	38.3	8.94
Danville	16	72	6	28	46.5	0.65	3	72	14, 15	8	39.8	8.63
London	17	75	6	21	45.8	......	......	......	......	......	......	......
OHIO.												
Austinburg	16	70	11	20	38.5	1.65	3	56	16	—2	28.1	3.00
Saybrook	16	69	11	16	40.6	2.25	12	58	16	1	30.9	4.55
New Lisbon	16	65	11, 13	22	39.5	1.03	4	68	15	5	33.6	2.03
East Fairfield	16, 17	64	11, 12	23	40.9	0.79	3, 4	62	15, 16	5	32.9	1.61
Steubenville	......	......	......	......	41.5	0.86	......	......	......	—5	35.4	3.31
Welshfield	16	69	11	20	40.1	2.05	3	57	15, 23	2	31.3	3.81
Milnersville	17	66	8	18	......	......	4	60	23	0	30.0	3.02
East Cleveland	16	70	11	16	41.2	0.86	12	61	15	3	32.8	3.71
Wooster	16	71	28	18	38.4	......	12	60	23	—4	41.4	......
Gallipolis	16	70	28	24	42.2	1.00	3	75	23	9	40.2	5.13
Kelley's Island	16	61	11, 12	32	42.8	0.43	3, 4	52	23	6	31.6	3.26
Norwalk	16	72	11, 12, 28	23	39.7	0.50	4	59	23	—2	30.6	2.81
Westerville	16	70	11, 20, 27, 28	24	40.0	......	3	63	15	1	33.0	4.11
[illegible]gston	16	73	12, 28	22	41.5	0.51	3	72	15	4	35.7	3.10
[illegible]do	16	67	28	26	41.1	0.31	11	51	28	10	29.9	3.56

Meteorology of 1865—Continued.

in States and erritories.	November. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	December. Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
o—Cont'd.												
		Deg.		Deg.	Deg.	In.		Deg.		Deg.	Deg.	In.
a	16	68	28	21	38.9	0.57	3	58	23	— 1	31.1	3.60
a University	16	71	12, 21	22	38.6	0.73	4	64	14, 15	1	31.3	3.20
orough	16	69	6, 12, 28	28	41.7	0.58	3	68	15	4	33.7	4.49
....	15	79	12	30	45.7	0.64	2, 3	68	15	9	40.0	3.73
....	16	71	12, 27	25	41.4	0.75	3	71	15	4	36.1	4.38
nati	16	75	8, 12 24, 28	28	43.3	0.56	3	69	14	5	37.0	3.89
e Hill	16, 17	70	11	29	42.8	0.28	......	......	......	......	......	......
rs' School ...	15	70	8, 11, 13 20, 24	26	40.5	0.30	3	70	15	3	32.9	4.88
CHIGAN.												
e	16, 17	66	12	25	39.1	0.01	3	55	23	— 2	30.5	1.86
Ag. College..	16	66	24, 27	23	38.6	0.08	11	46	23	— 5	26.7	1.43
tead	15	60	26	24	38.6	......	11	47	23	— 5	25.0	......
NDIANA.												
....	16	78	8, 12, 13	24	44.1	1.25	3	76	15	4	36.7	6.70
ond	16	68	27	20	37.8	0.73	2, 3	58	14, 15	1	31.4	4.40
nd	16	68	7, 21	24	41.0	0.80	2, 3	58	14	— 1	30.0	4.10
n	16	74	27, 28	30	......	......	......	......	......	......	......	......
bia City	13, 15, 16	72	29	18	40.4	0.35	3	58	23	—12	27.0	2.73
apolis	15, 16	65	7, 27	22	39.3	......	3	60	14	— 1	30.6	......
Harmony	15, 16	63	7, 27	27	44.6	0.21	3	70	14	5	34.8	5.84
LINOIS.												
o	16	60	5, 27	20	37.3	......	11	42	21	—12	20.5	......
on	15	65	5	30	43.7	0.32	7	49	21	— 9	24.9	......
go	......	......	......	......	......	......	11	45	21	—11	21.5	......
....	13	64	27	18	38.2	1.23	......	......	22	—22	......	0.30
....	13	58	5, 22	25	39.0	0.67	11	45	21	—15	22.2	0.60
ich	13	62	7	21	37.5	0.37	11	45	21	—17	20.3	0.45
....	13, 16	65	7	25	40.1	0.49	11	49	21	—19	23.7	0.59
bago	13	62	27	22	38.0	0.42	11	43	21	—17	19.0	0.74
....	12	67	5	22	41.8	0.28	11	50	21	—17	22.1	0.54
ra	16	62	5	26	41.8	......	11	58	21	—12	24.1	......
....	16	61	5	20	40.6	0.19	10	49	21	—18	22.8	0.40
in	13	66	5	25	42.0	......	11	48	21	—16	21.0	......
....	16	65	5	26	42.8	0.31	11	50	21	— 9	25.5	1.08
field	13	76	7, 11, 27	30	47.2	......	2	62	21	— 4	28.8	......
....	17	68	7	23	44.4	0.35	10	57	14	— 2	30.5	5.75
ly	16	68	5, 7	22	41.8	0.00	11	55	21	—10	25.0	2.15
rg	16	67	5	22	40.8	0.00	2	45	21	—14	21.7	1.00
a	16	69	5	22	42.1	0.12	11	51	21	—16	23.8	1.25
ster	......	......	......	......	......	......	2	57	15, 21	— 7	25.3	1.63
SCONSIN.												
woc	14	63	5, 7, 30	28	41.1	0.54	10, 11	44	15	— 8	24.2	0.77
kee	15	65	5	28	42.7	0.41	10	44	15	— 8	23.9	......
....	15	61	5	23	40.1	......	10	43	15	— 9	22.2	......
....	13, 14	59	5	24	......	......	......	......	......	......	......	......
n	13	60	26	22	37.6	0.10	11	45	15	—11	19.7	0.32
eca	14	64	5, 27	25	39.4	......	11	44	15	—11	21.1	0.11
wega	13, 15	62	5	21	39.3	0.10	26	50	15	—15	22.0	......
rass	15	64	27	22	37.5	0.84	2	44	15	—16	19.2	0.85
Run	14	62	5, 9	23	37.1	0.38	10	45	15	—12	21.4	0.38
o	13, 15, 16	64	5, 26	24	41.8	1.66	3	46	14, 21	— 4	23.3	0.85
....	14	60	26	19	37.1	0.10	10	45	21	—20	20.5	1.40
th	15	61	4, 5, 7, 18, 27, 30	25	38.5	0.40	10, 11, 25, 26	43	15	—13	21.0	0.80
....	......	......	......	......	......	......	3	40	15, 22	— 6	......	......
NESOTA.												
Bay	13	58	27	25	39.8	0.33	25	42	20	—16	13.7	0.77
....	14	64	27	11	37.7	......	10, 24	37	21	—32	10.6	......
....	15	63	27	18	37.0	0.23	10	36	21	—26	10.3	2.19
polis	15	67	5	15	36.8	0.63	10	41	21	—33	8.0	2.28
City	15	66	5	14	36.6	0.50	9	44	15	—30	12.0	1.70
....	15	66	27	15	38.3	0.62	24	37	22	—26	......	0.[illegible]
lm	15	71	27	18	40.0	0.31	10	42	21	—22	11.8	0

Meteorology of 1865—Continued.

Places in States and Territories.	NOVEMBER.						DECEMBER.					
	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.	Date.	Max. temp.	Date.	Min. temp.	Mean temp.	Rain or melted snow.
IOWA.		*Deg.*		*Deg.*	*Deg.*	*In.*		*Deg.*		*Deg.*	*Deg.*	*In.*
Clinton	15, 16	65	27	20	39.6	1.00	25	46	21	—20	21.0	2.25
Lyons	14	64	4	26	40.4	0.42	11	52	14	— 8	20.3	......
Davenport	17	69	5	22	39.3	0.24	11	43	21	—15	20.4	0.40
Dubuque	14	63	27	25	40.9	0.20	10	44	21	—18	20.8	1.04
Muscatine	16	64	27	17	36.5	0.20	11	44	21	—17	21.0	0.62
Fort Madison	16	65	5	21	42.1	0.28	1	51	21	—15	25.1	1.11
Guttenberg	16	64	27	21	38.5	0.41	10	45	21	—21	17.5	......
Ceres	15	63	5, 27	22	36.3	......	11	42	21	—22	17.3	......
Manchester	14	64	27	12	36.5	0.89	25	42	21	—27	17.7	0.46
Mount Vernon	14	63	5	22	39.5	......	11, 25	44	21	—18	19.0	......
Iowa City	13	66	5	20	42.6	0.25	11	50	21	—17	21.0	0.32
Independence	16	67	27	13	36.4	0.80	25	44	21	—27	14.0	1.60
Waterloo	16	66	5, 27	18	40.2	......	11, 25	46	20	—13	18.6	......
Iowa Falls	14, 16	62	5	*18	37.8	0.03	10	38	22	—12	17.1	1.17
Des Moines	16	67	5	17	40.2	0.25	1	50	21	—22	19.2	......
Clarinda	......	......	......	......	......	......	1, 4, 28	48	21	— 9	26.0	0.81
MISSOURI.												
St. Louis	8	70	5	27	47.1	0.00	2	62	21	1	30.4	3.63
St. Louis University	8, 16	70	5	28	49.1	0.08	2	64	21	2	32.2	2.80
Athens	16	63	6	28	46.2	2.75	11	60	21	—10	27.0	0.75
Canton	16	69	5	19	40.6	......	1	50	21	—19	22.4	1.22
Harrisonville	8, 16	68	5	20	46.8	0.04	1	56	21	— 7	24.6	1.03
Easton	16, 23	69	2, 26, 29	25	46.5	0.01	1	56	21	—12	22.8	1.80
KANSAS.												
Olatha	8, 23	69	5	20	44.4	......	1	57	21	— 9	22.7	1.76
Atchison	10, 11	74	5	18	44.3	......	3	50	14, 15	— 8	21.2	......
Fort Riley	23	72	2, 27	26	48.3	......	1	56	13, 15	— 7	21.2	1.25
NEBRASKA.												
Elkhorn	23	67	5	17	41.9	......	1	56	21	—20	15.7	0.63
Bellevue	12, 15	68	5	24	45.2	......	1	52	21	—15	16.3	1.39
UTAH.												
Great Salt Lake City	22	71	1	22	45.2	4.22	1	42	15	6	23.0	6.69
St. George	15	72	30	27	......	0.25	20	68	29	5	......	1.30
St. Mary's	21	66	1, 27, 28	16	40.5	......	24	36	14, 15	—14	14.5	......
CALIFORNIA.												
San Francisco	4, 5	70	24	44	55.8	3.27	10, 24	57	18, 19	35	45.0	0.76
Sacramento	4	74	26	45	56.9	2.43	10	58	19	31	45.0	0.75
Monterey	2	82	23, 25	40	56.7	1.78	8	58	19	31	47.0	1.56
Meadow Valley	5	65	11	27	43.9	......	8, 9, 10, 27	47	4	7	31.5	1.70
Nevada City	6	68	24	46	45.5	......	......	......	......	......	......	......
WASHINGTON.												
Neeah Bay	9, 12	58	15, 23, 24	36	46.2	27.60	7	50	12	22	35.5	14.00
OREGON.												
Albany	......	......	......	......	......	14.43	......	......	......	......	......	12.25
NEVADA.												
Star City	7	68	28	22	44.0	......	9	48	14, 15, 18	2	20.5	5.50

INDEX.

A.

INDEX.

INDEX.

INDEX.

N.

O.

INDEX.

T.

U.

W.